A REVIEW OF CORYLOPSIS (HAMAMELIDACEAE)

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AN EXAMINATION OF HERBARIUM MATERIAL and cultivated representatives of *Corylopsis* suggests that species have been named indiscriminately on the basis of incomplete specimens and an inadequate knowledge of variation within the genus. The fact that leaves of species of *Corylopsis* appear only after the flowers have fallen makes it necessary to gather two collections for every complete herbarium specimen. This situation, as well as the variability of the genus in China, has reduced parts of the taxonomy of these plants to a state of confusion.

To date, 33 species of *Corylopsis* have been described. All are shrubby plants valuable for their fragrant, yellow-flowered inflorescences borne on leafless twigs in early spring in the Northern Hemisphere. The genus has a distribution extending from the Himalayas in Bhutan, through Assam, across China, and into Taiwan and Japan; a species has also been described from Korea. For the distribution of the species recognized in this treatment, reference should be made to FIGURE 1.

Corylopsis occurred in the Boreal-Tertiary angiosperm flora (Takhtajan, 1969), having been found in Tertiary fossil beds, and the genus is also known from the London Clay flora of the early Eocene (Takhtajan, 1969).

At the present time, it is possible to recognize a Himalayan and a Chinese group of phenotypes, but upon closer analysis there is intergradation between the two divisions in areas such as Yunnan Province. The Chinese group can be subdivided further into a continental and an offshore group, the latter being found in Japan and Taiwan. The continental taxa are in general less morphologically distinct from one another than are the offshore taxa, which include species such as *Corylopsis spicata* Sieb. & Zucc. and *C. pauciflora* Sieb. & Zucc. At the same time, there are similarities between the continental and offshore species. A description of anthesis and a summary of the published cytological data available for the genus is given below, together with a new classification and a key to the species.

ANTHESIS

The spatial arrangement of petals, stamens, stigmas, and nectaries in *Corylopsis* flowers has received much attention from taxonomists, but it may be equally if not more useful to an understanding of the breeding system of the plants than it is to their taxonomy and relationships. The following observations show how the spatial arrangement of floral organs changes with time, and how an herbarium-based taxonomic study may relate to any one of a number of stages seen during the maturation of the inflorescence.

Several tightly imbricated inflorescence bracts protect the flowers during winter. Pollen is formed during the preceding August and September.

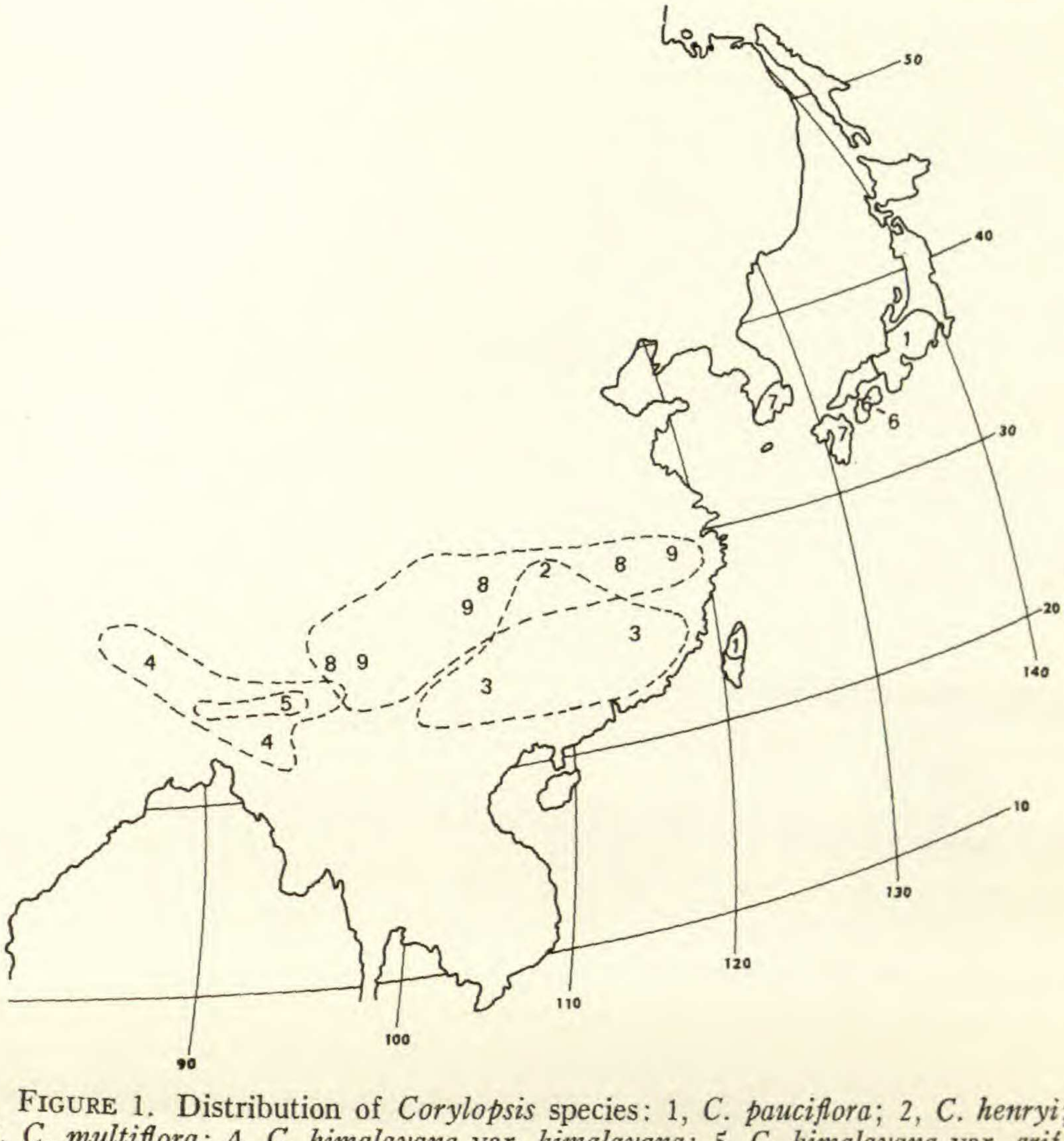


FIGURE 1. Distribution of *Corylopsis* species: 1, *C. pauciflora*; 2, *C. henryi*; 3, *C. multiflora*; 4, *C. himalayana* var. *himalayana*; 5, *C. himalayana* var. *griffithii*; 6, *C. spicata*; 7, *C. glabrescens*; 8, *C. sinensis* var. *sinensis*; 9, *C. sinensis* var. *calvescens*.

The inflorescence bracts are shed in February and March, exposing the flower buds, which are protected further by floral bracts that may or may not be hairy. As the floral bracts gradually expose each flower (FIGURE 2, a), the five yellow petals begin to part and expand, allowing the two styles to protrude from the flower. By this time the stigmas are receptive. In cultivation, styles at the same developmental stage protrude most from flowers of *Corylopsis glabrescens* Fr. & Sav. and least from those of *C. platypetala* Rehder & Wilson var. *levis* Rehder & Wilson (= *C. sinensis* var. *calvescens*) (see FIGURE 2, b). At this point the anthers have not dehisced and are borne on filaments shorter than the styles. Except for *C. veitchiana* Bean, now recognized as a form of *C. sinensis* var. *calvescens*, this dichogamous condition was found in all cultivated corylopses examined, and for the majority, this stage represents protogyny of the flowers.

The anthers dehisce only when the petals are fully expanded and the nectaries are revealed, at which time filament elongation has brought the

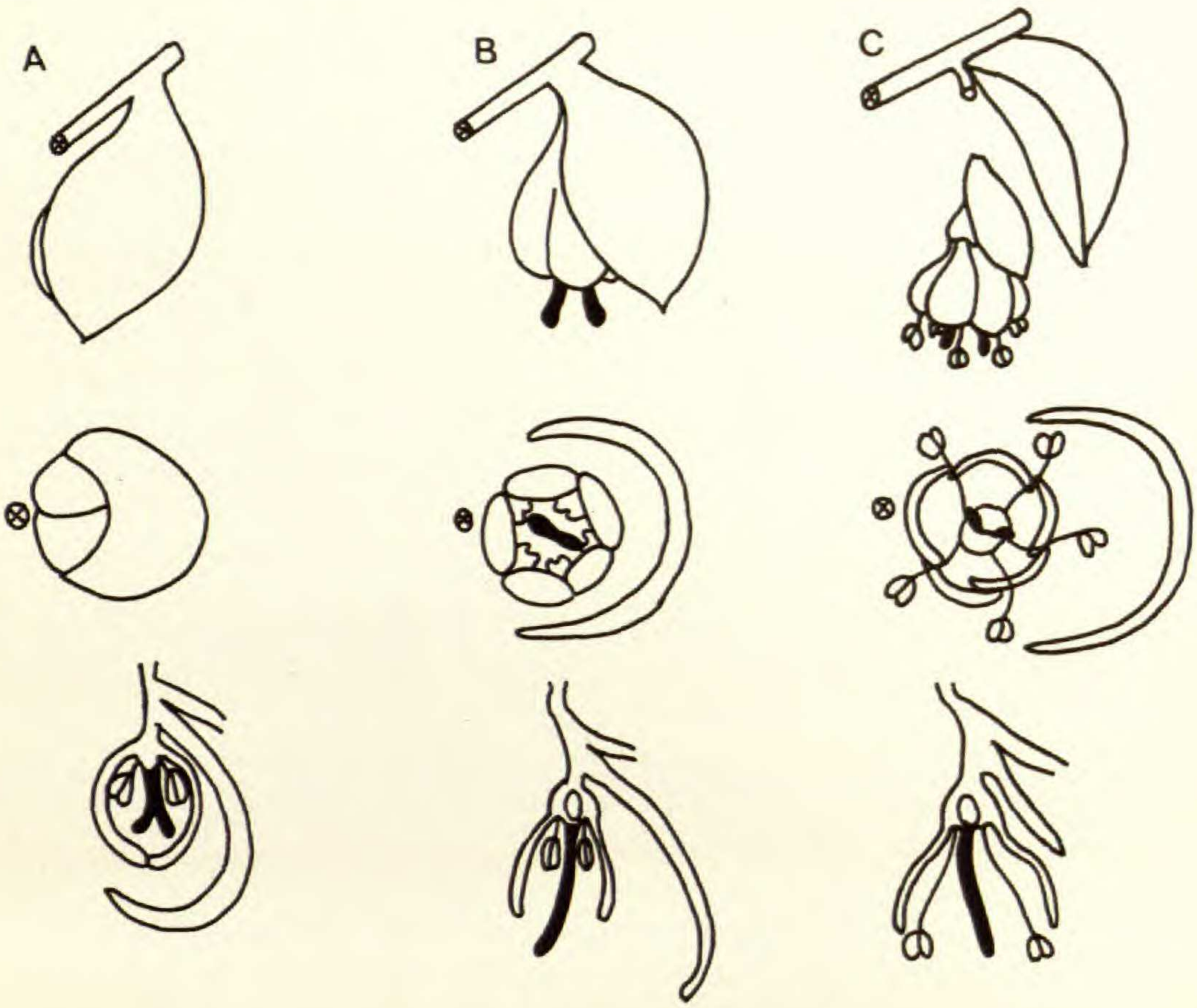


FIGURE 2. Anthesis in *Corylopsis*. Flowers shown from side, from below, and in section: a, unopened; b, stigmas exserted; c, fully open.

anthers to a level with or above the stigmas (FIGURE 2, c). Anther dehiscence and senescence is not always simultaneous within any one flower. Partial dichogamy is evident, since at this stage an inflorescence may bear flowers in phases a, b, or c, as shown in FIGURE 2, and geitonogamy is observed to occur by the activity of feeding insects such as honey bees, blowflies, and hover flies. Finally, all of the flowers are functionally hermaphroditic, and in the final stages of anthesis the floral organs begin to wither, the fruits begin to develop, and the leaves begin to expand.

As stated by Faegri and van der Pijl (1971), protogyny may be efficient as a measure against selfing if the stigma is receptive for only a matter of hours before the anthers dehisce, because after any allogamous pollen has germinated on the stigma there is almost immediate competition for ovules. In *Corylopsis*, where each ovary has only two ovules, prevention of selfing would seem to be almost assured by the partial dichogamy observed to extend over a period of at least 24 hours.

In cultivation at Glasnevin, *Corylopsis platypetala* (= *C. sinensis* var. *calvescens*) appears to flower earlier than *C. willmottiae* Rehder & Wilson

(= *C. sinensis* var. *sinensis*), as indicated in HISTOGRAM 1. Furthermore, microclimatic differences cause different flowering times on different parts of the same plant (see data for *C. gotoana* (= *C. glabrescens*) in HISTOGRAM 1). It follows that if this behavior is also found in nature (there is no reason to suppose that it does not), we may speculate that selfing on a shrub could take place until sufficient numbers of neighboring plants come into flower, at which time outcrossing could occur. Such a breeding system, together with polyploidy, helps to explain some of the complex variation patterns found in wild corylopses.

The flowers of most *Corylopsis* species appear to be adapted for allogamy on the basis of floral mechanism and size of genitalia, but as Stebbins (1970) notes, autogamy is often associated with reduction of flower size, and the smaller-flowered *C. himalayana* Griffith and *C. manipurensis* Hemsley (= *C. himalayana*) may prove to be autogamous. In these Himalayan taxa the stigmas are noticeably shorter in relation to petal length than is the case with the corresponding relationships of Chinese and Japanese taxa.

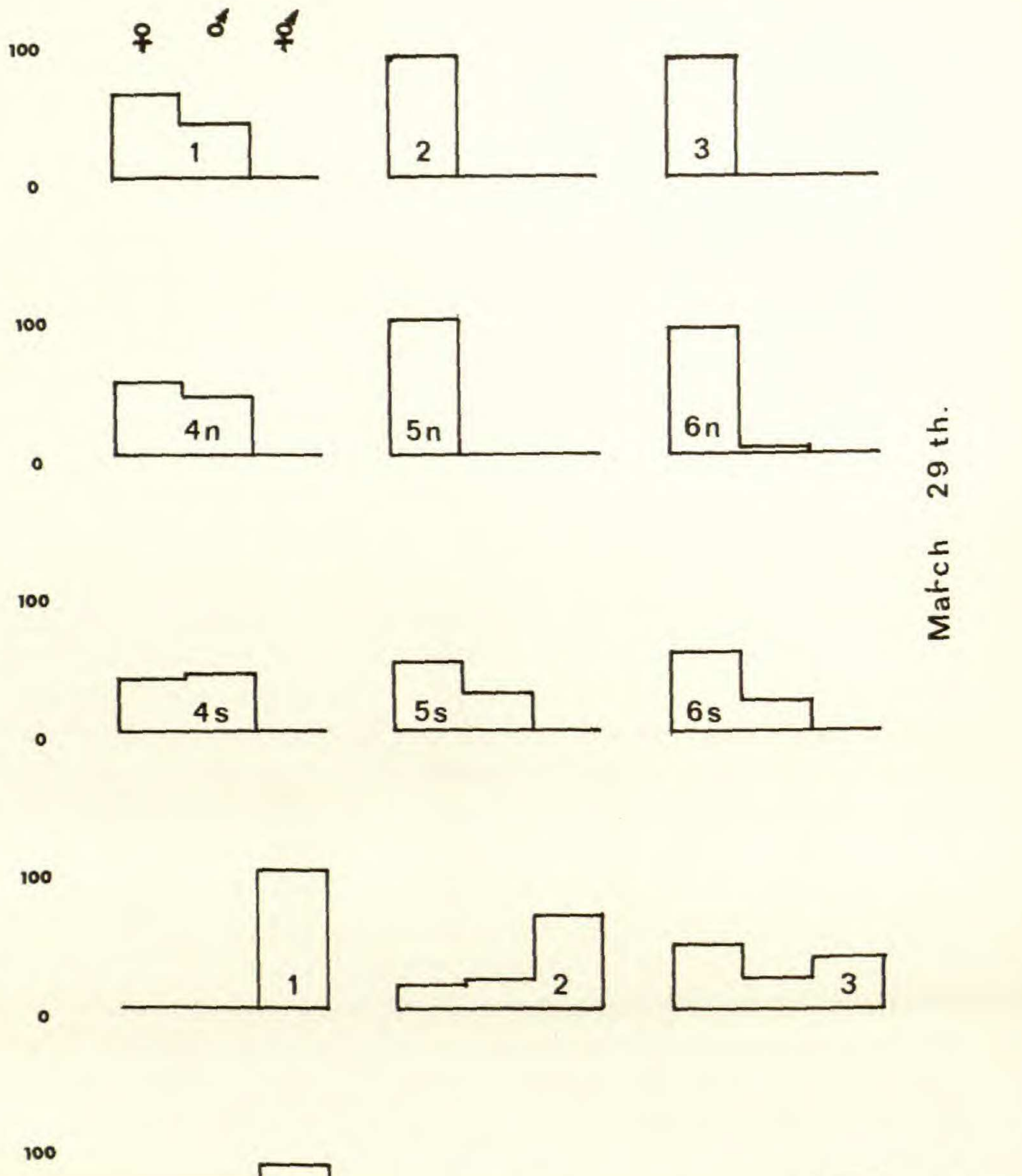
As shown in HISTOGRAM 2, all cultivated corylopses, with the exception of *Corylopsis pauciflora*, have roughly the same proportion of functionally female and hermaphroditic flowers at equivalent stages during anthesis, regardless of when flowering begins. There is no trend toward dicliny, as is found in the related genus *Sinowilsonia* Hemsley. Moreover, the absolute number of flowers in an inflorescence partly determines the duration of flowering.

An air frost of 2° C. for one night in 1972 killed the flower buds of *Corylopsis veitchiana* (a form of *C. sinensis* var. *calvescens*), but not those of *C. spicata*, *C. glabrescens*, or *C. platypetala* (= *C. sinensis* var. *calvescens*), which at Glasnevin were all similarly exposed. Fruits containing fertile seeds are regularly found on cultivated plants from September to December, so that the observed visits by pollen vectors seem to be pollination visits. Corylopses are insect pollinated in cultivation, but observations in nature are lacking. The flowers do not seem specialized for visits by any particular type of insect, and both dipterans and hymenopterans have been seen visiting the flowers to obtain the secretions from the nectaries.

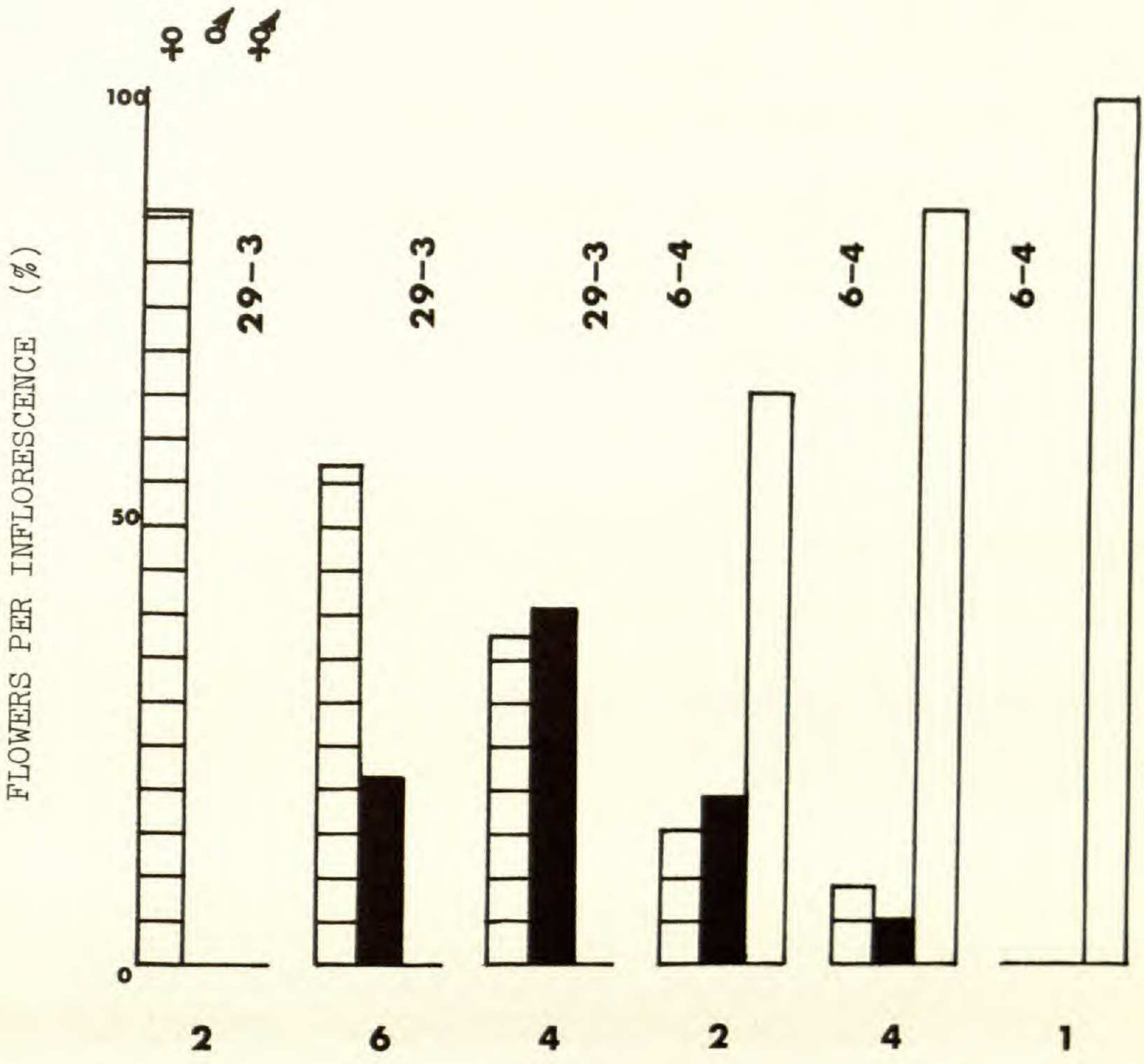
FLOWERS AND ANTHESIS IN RELATED GENERA

The relationship between the floral morphology and anthecology of *Corylopsis*, *Fortunearia* Rehder & Wilson, and *Sinowilsonia* require further study because the Chinese genera seem to illustrate stages in an evolutionary sequence from the hermaphroditic, entomophilous flower in *Corylopsis* to a unisexual (entomophilous?) one in *Sinowilsonia*. TABLE 1 shows some morphological differences between the three genera.

As noted above, the floral biology of *Corylopsis* is adapted to entomophily and outcrossing, with conspicuous nectaries, broad petals, and long stamens in the majority of species. Flowers appear before the leaves, thus



HISTOGRAM 1. Changes in functional sexuality of inflorescence during anthesis in selected *Corylopsis* species: 1, *C. spicata*; 2, *C. glabrescens*; 3, *C. willmottiae*; 4, *C. platypetala*; 5, *C. gotoana*; 6, *C. sinensis* (all cultivated at Glasnevin; n = north-facing twigs, s = south-facing twigs).



ABSOLUTE NUMBERS OF FLOWERS PER INFLORESCENCE

	flower number	sample
C. pauciflora	2	7
C. spicata	5-10	22
C. platypetala	9-16	150
C. yunnanensis	5-18	104
C. sinensis	6-18	129
C. willmottiae	11-18	118
C. glabrescens	10-21	98
C. platypetala var. levis	12-22	171
C. gotoana	12-22	149
C. veitchiana	15-30	161

HISTOGRAM 2. Summary of changes in functional sexuality of the inflorescence of *Corylopsis* (species as numbered in HISTOGRAM 1).

TABLE 1. **Differences between Corylopsis, Fortunearia, and Sinowilsonia.**

Character	Corylopsis	Fortunearia	Sinowilsonia
INFLORESCENCE	Axillary racemes on short shoots	Terminal racemes	Terminal and axillary racemes
SEX OF PLANT	Hermaphroditic, partial dichogamy	Andromonoecious	Unisexual; monoecious
SEPALS	Five small	Five small	Five spathulate
PETALS	Five large, ovate	Five subulate, equaling the sepals in length	Absent
STAMENS	Five with long filaments	Five almost sessile	Five with long filaments
DISC	Five bifid or truncate nectaries	Absent	Absent
HYPANTHIUM	Fused to ovary except in *C. henryi*, *C. brevistyla*, and *C. stelligera*	Fused to ovary	Free from ovary
FRUIT	Almost sessile	Stalked	Sessile

making the hermaphroditic and partially dichogamous inflorescences more conspicuous.

In contrast, the flowers of *Fortunearia* lack nectaries, have more inconspicuous, subulate petals as long as the sepals, and have almost sessile stamens and revolute styles; the stigmas come in proximity with the stamens. These attributes suggest a trend away from a pollination strategy like that of *Corylopsis*, with the development of andromonoecy. Some corylopses have attributes reminiscent of those of *Fortunearia*: the short stamens of *C. himalayana*, the truncate nectaries of *C. multiflora* (assuming that the truncate nectary is a reduction from the more common bifid condition in *Corylopsis*), and the elaboration of sexual phases in the raceme during anthesis. The male flowers of *Fortunearia* develop in autumn, are naked in winter, and have only a rudimentary ovary. Certain abortive *Corylopsis* flowers were found to have reduced stamens.

Sinowilsonia has diclinous flowers that lack nectaries and petals. The females possess five mucronate staminodes, but the males lack a vestigial gynoecium. Unlike most corylopses and *Fortunearia*, the ovary of *Sinowilsonia* flowers is not fused to the inner wall of the hypanthium, which almost completely encloses the ovary. Such a free ovary is also found in certain species of *Corylopsis*. The reproductive strategy in *Sinowilsonia* is

away from the showy displays that characterize *Corylopsis*. Outcrossing would be assured only by dichogamy of the separate sexes, for which no observations can be found. Alternatively, *Sinowilsonia* could be adapted to selfing by geitonogamy, but the development of unisexual flowers seems pointless when hermaphroditic ones can do the same job. It may be worth pointing out that *Sinowilsonia* is not andromonoecious as was stated by Sargent (1913); there are no hermaphroditic flowers, only ones with ovaries and staminodia.

CYTOLOGY

Hara (1972) described the polyploid differentiation of related species in Japanese and Sino-Himalayan species of *Aucuba* Thunb. and *Helwingia* Willd. The genus *Corylopsis* shares with these two genera a somewhat similar geographical distribution pattern, and available cytological data suggest that polyploid differentiation is parallel to the situation found in *Aucuba*, *Helwingia*, and other genera (see TABLE 2).

Apart from the fact that both *Corylopsis himalayana* and *C. pauciflora* are diploids and have quite distinctive and different phenotypes, there are no close correlations between the gross morphology of the plants and the chromosome number. As Anderson and Sax (1935) noted, "discovery [of polyploid series in *Fothergilla* and *Corylopsis*] is of . . . consequence since it indicates that in such genera we may expect . . . relationships between species which will be, in part at least, reticulate." Reticulate variation of morphological characters is common in the genus *Corylopsis*.

There is some relationship between published cytological and geographical data as far as the Japanese taxa are concerned, and more detailed work in Japan would help to clarify whether any meaningful evolutionary pattern exists. There is a lack of cytotaxonomic data for Chinese taxa; only the Himalayan *Corylopsis himalayana* has been examined cytologically. One might speculate that the large-leaved *C. himalayana* var. *griffithii* is a polyploid. The basic chromosome number for the genus seems to be $x = 12$.

TABLE 2. **Chromosome numbers in the genus Corylopsis.**

SPECIES	DISTRIBUTION	*n*	REFERENCE
C. himalayana	Himalaya	12	Mehra & Khosla, 1969
C. sinensis	China	12	Santamour, 1965
C. platypetala	China	12	Santamour, 1965
C. pauciflora	Japan	12	Anderson & Sax, 1935
C. pauciflora	Japan	12	Santamour, 1965
C. glabrescens	Japan	24	Santamour, 1965
C. willmottiae	China	24	Santamour, 1965
C. veitchiana	China	36	Anderson & Sax, 1935
C. veitchiana	China	36	Santamour, 1965
C. spicata	Japan	36	Anderson & Sax, 1935
C. spicata	Japan	36	Santamour, 1965

MORPHOLOGY

The following observations are based on examination of living plants at Glasnevin, Kew, and Mount Congreve Garden in Ireland, as well as from study of herbarium specimens from Kew, the British Museum (Natural History), Edinburgh Botanic Garden, Cambridge Botanic Garden, Wisley, the Arnold Arboretum and Gray Herbarium of Harvard University, U.S. National Herbarium, Smithsonian Institution, New York Botanical Garden, National Taiwan University, and Botanical Institute, Peking.

LEAF SHAPE. No significant differences in leaf shape were found in most of the cultivated taxa. The few exceptions, not in general cultivation, are *Corylopsis manipurensis* (= *C. himalayana*), with elliptical leaves having closely spaced veins, and *C. multiflora* Hance, which often has leaves with a conspicuously attenuate apex. The remaining taxa have ovate, obovate to orbicular leaf blades, the bases of which may be cuneate, oblique, or cordate.

The spacing of the nerves has an important, if in most cases taxonomically insignificant, effect on the appearance of the leaf. Spacing tends to be narrower on immature or poorly grown leaves. When closely spaced, the margin may appear serrate, as in *Corylopsis multiflora* or *C. polyneura* (= *C. sinensis*), or more characteristically sinuately dentate to denticulate, as in *C. manipurensis* (= *C. himalayana*), *C. spicata*, or *C. sinensis*. Protrusion of the veins beyond the leaf margin also determines the expression of margin elaboration, as for example when the leaves of *C. veitchiana* (= *C. sinensis* var. *calvescens* forma *veitchiana*) and *C. spicata* are compared. In certain specimens the leaves appear to have an entire margin because the teeth are revolute and the whole lamina is convex in profile; in cultivation this condition is seen in plants under water-stress or grown in exposed situations.

LEAF SIZE. The leaves of *Corylopsis pauciflora* rarely exceed 6 cm. in length; most other taxa have larger mature leaves to about 10 cm. Only *C. himalayana* var. *griffithii* has leaves regularly longer than 10 cm.

LEAF VESTITURE. The adaxial leaf surface is glabrous when mature, but when young it may be covered with an ephemeral sericeous indumentum of no taxonomic value. Such immature leaves may also appear glaucous or red-tinted in certain cultivated clones, i.e., *C. willmottiae* cv. Spring Purple (Hillier, 1974).

The abaxial leaf vestiture may persist until leaf-fall, and, in combination with inflorescence vestiture, it provides a useful character for identification of certain species. The petiole, and also the abaxial veins, may be tomentose, sericeous, sparsely glandular-hairy, glabrous and glaucous, or simply glabrous when mature; the petiole and vein vestiture appear to be linked characters. The lamina between the veins may be tomentose, sericeous, glabrous (and rough or smooth textured), or glabrous and glaucous, and while petiole and vein vestiture are normally correlated, that of the

lamina is not. This situation gives rise to a range of vestiture permutations, which are listed in TABLE 3.

The leaf vestiture of plants segregated as *Corylopsis trabeculosa* Hu & Cheng resembles that of *C. himalayana*, but the latter species does not always have the characteristic dense, rusty abaxial hairs shown in most specimens, e.g., *Gallatly 2775* (K!). Instead, the vestiture of *C. himalayana* can approach that of *C. sinensis*, with more of a colorless pubescence, as in *Cooper 1316* (K!) or *Gallatly 665* (K!).

INFLORESCENCE SIZE. The size of the inflorescence is a useful character to distinguish *Corylopsis pauciflora* from other taxa: it is short and consists of only one to five flowers. Other species tend to have inflorescences exceeding 5 cm. in length and containing more than five flowers. Apart from *C. pauciflora* and the synonymous *C. matsudai* Kanehira & Sasaki, all corylopses have catkin-like racemose inflorescences. *Corylopsis hima-*

TABLE 3. **Permutations of abaxial leaf vestiture in Corylopsis.**

TAXON	PETIOLE	VEIN	LAMINA
C. griffithii	T	T	T
	T	T	S
C. himalayana	T	T	GB
	S	S	T
	S	S	GB
C. multiflora	T	T	T
	T	T	GB
C. willmottiae	T	T	GB
	S	S	S
	S	S	GB
C. spicata	T	T	S
C. sinensis	S	S	T
	S	S	S
C. glabrescens	S	S	GB
C. pauciflora	S	S	GB
C. platypetala	S	S	GB
	GN	S	GB
C. yunnanensis	GB	S	S
C. manipurensis	GB	S	GB
C. glaucescens	GB	GB	GC
C. veitchiana	GB	GB	GB
C. glandulifera	GN	S	GB
C. hypoglauca	GN	GB	GC

T = tomentose-pubescent, S = sericeous, GB = glabrous, GC = glaucous, and GN = glandular.

layana and *C. manipurensis* (= *C. himalayana*) differ from the Chinese and Japanese species in having inflorescences with narrower petals and with flowers often more widely spaced apart on the rachis.

INFLORESCENCE VESTITURE. The hairs on the inflorescence can be divided into two categories: those on the rachis, and those on the bracts inserted on the rachis. TABLE 4 shows the condition(s) in the more commonly grown species. It is apparent that inflorescence vestiture is variable in taxa such as *Corylopsis sinensis*, but less so in *C. multiflora*. FIGURE 3 shows typical rachis bracts of *C. sinensis* and *C. himalayana*, as well as of intermediates collected by Augustine Henry (*5854*, K) and E. H. Wilson (*65*, K). The Henry material from Hupeh Province is, on the basis of other characters, best placed in *C. sinensis*, but in certain characters it approaches the variation seen in *C. himalayana* and *C. himalayana* var. *griffithii*. The same situation is found in *Schneider 753* (K), which is from southern Szechuan and is labeled *C. yunnanensis* (= *C. sinensis*). *Wilson 65* (K) shows further intermediate inflorescence vestiture between *C. sinensis* and *C. himalayana*.

FLOWERS. The vestiture of the floral organs is as variable as that of the vegetative ones. Thus, type material of *Corylopsis yunnanensis* (= *C. sinensis*) has a glabrous hypanthium and sepals (*Forrest 4095*), but *Schneider 2794* has a hirsute hypanthium. Type material of *C. willmottiae* (= *C. sinensis*) has a glabrous hypanthium and sepals (*Wilson 1316*), as does *McLaren 126*, but *Forrest 7252* has basally hairy hypanthia with sepals

TABLE 4. **Inflorescence vestiture in Corylopsis.**

	VESTITURE TYPE		
RACHIS	Tomentose-pubescent	Sericeous	Glabrous
	C. glabrescens *C. griffithii* *C. henryi* *C. himalayana* *C. manipurensis* *C. multiflora* *C. sinensis* *C. spicata* *C. willmottiae* *C. yunnanensis*	*C. glandulifera* *C. platypetala* *C. pauciflora* *C. sinensis* *C. veitchiana* *C. yunnanensis*	*C. glabrescens* *C. glaucescens* *C. hypoglauca* *C. henryi* *C. pauciflora*
FLORAL BRACTS	*C. griffithii* *C. henryi* *C. himalayana* *C. manipurensis* *C. multiflora* *C. sinensis* *C. yunnanensis*	*C. glabrescens* *C. glandulifera* *C. pauciflora* *C. platypetala* *C. sinensis* *C. spicata* *C. veitchiana* *C. willmottiae*	*C. glabrescens* *C. glaucescens* *C. henryi* *C. hypoglauca* *C. pauciflora* *C. spicata* *C. sinensis*

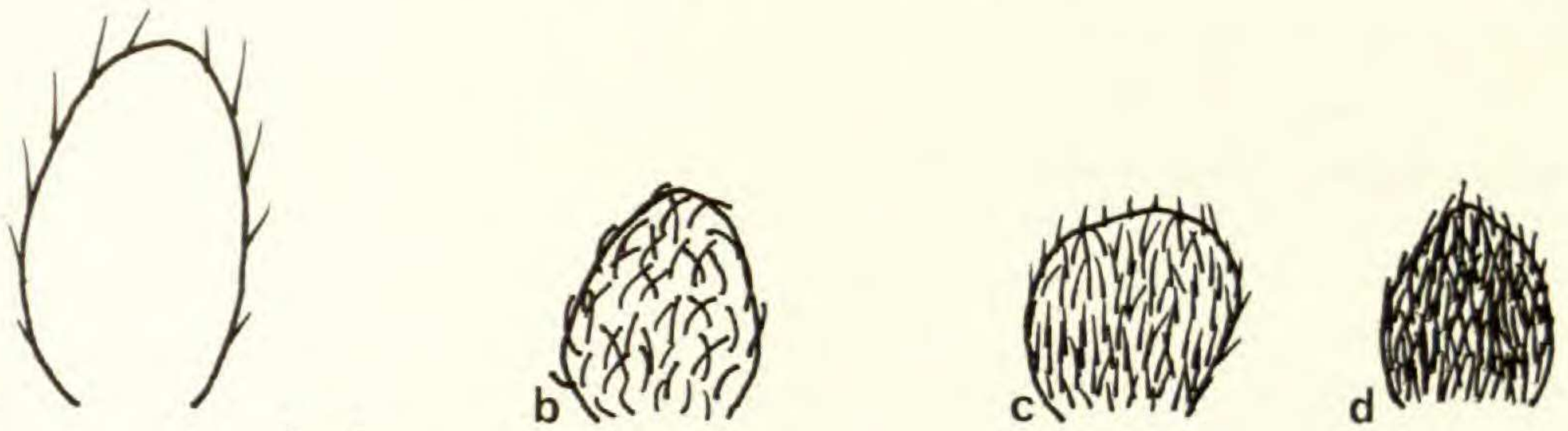


FIGURE 3. Rachis bracts: a–c, *C. sinensis* var. *sinensis* (a from *Ching 2598*, b from *Wilson 65*, c from *Henry 5854*); d, *C. himalayana* var. *himalayana* (*Griffith s.n.*, K). Bar scale = 1 mm.

fringed with hair at the margins. Material of *C. himalayana* (*Griffith s.n.*), from Bhutan, has a glabrous hypanthium and sepals, but other collections often show vestiture. The same can be said for specimens of *C. veitchiana* (= *C. sinensis* var. *calvescens* forma). The flowers may be discussed in terms of (a) the hypanthium or "calyx tube," (b) the nectaries, (c) the stamens, and (d) the petals.

HYPANTHIUM. Most corylopses have an ovary that is at least partly adnate to the inside of the hypanthium, but this is not so in *Corylopsis henryi*, *C. brevistyla* (= *C. henryi*), and perhaps *C. stelligera* Guillaumin (= *C. henryi*), all of which have more or less free ovaries. The hypanthium has several types of vestiture (see TABLE 5).

The majority of corylopses have conspicuous sepals, which may differ in shape from species to species. Thus, *Corylopsis spicata* has long leafy sepals, while *C. sinensis* has shorter, more fleshy ones. *Corylopsis multiflora*, including the synonymous taxa *C. wilsonii* and *C. cavaleriei* (see below), is notable for lacking free sepals.

TABLE 5. **Hypanthium vestiture in Corylopsis.**

SHORT PILOSE	PILOSE AT BASE	GLABROUS
C. griffithii	*C. glandulifera*	*C. glabrescens*
C. himalayana	*C. platypetala*	*C. glandulifera*
C. sinensis	*C. sinensis*	*C. glaucescens*
C. veitchiana	*C. spicata*	*C. henryi*
C. yunnanensis	*C. willmottiae*	*C. hypoglauca*
		C. himalayana
		C. multiflora
		C. pauciflora
		C. platypetala
		C. manipurensis
		C. spicata
		C. veitchiana
		C. willmottiae
		C. yunnanensis

NECTARIES. Only in *Corylopsis multiflora*, *C. wilsonii* (= *C. multiflora*), and *C. pauciflora* are the nectaries notably truncate and simple. In all other corylopses the nectaries are bifid, the tips being pointed or blunt. In some specimens of *C. glabrescens*, the nectaries are not the usual green color, but reddish. The nectaries are shiny and secrete a sweet fluid attractive to dipterans (*Calliphora erythrocephala* and *Melanostoma scalare*) and hymenopterans (*Apis mellifera*) at Glasnevin. The tips of the nectaries often bend at right angles away from the center of the flower.

STAMENS. Herbarium material does not facilitate study of the spatial relationships between the stamens, stigmas, and petals, relationships which have been shown above to change according to the age of the flower. As cultivated material is generally without known origin, it is important that field studies be carried out to determine the floral biology of as many of the wild species as possible. In particular, the lengths of the styles of Chinese and Himalayan taxa should be compared at the same stage of anthesis.

The filaments of most taxa are greenish when young and become yellow or whitish when mature, but in *Corylopsis spicata* they are often bright red. The anthers of most taxa are yellow before anthesis, but in *C. himalayana* var. *griffithii*, *C. spicata*, and *C. veitchiana* (= *C. sinensis* var. *calvescens* forma) they are reddish brown, while some plants of *C. sinensis* have orange anthers.

PETALS. Petal color is always yellow, but in *Corylopsis himalayana* it is often very pale yellow. The shape of the petals of different taxa has been used as a taxonomic character, but such action is partly responsible for the long synonymy in *Corylopsis*. Petal shape should be used only in conjunction with other characters in the delimitation of taxa. For example, the spathulate petals of *C. spicata* is one of a group of characters that distinguishes this species from *C. sinensis*, which has orbicular petals. Corylopses have clawed petals; in some species the length of the claw varies with age by a factor of three or four.

On the basis of herbarium study, petal size appears to distinguish *Corylopsis himalayana* and *C. manipurensis* (= *C. himalayana*) from Chinese taxa, the former possessing inflorescences that are not congested with open flowers like the Chinese taxa. Chinese material provides a greater amount of visual pollinator attraction; as a result, they are more valued horticultural subjects. Visual attraction is not as great in the Himalayan *C. manipurensis* (= *C. himalayana*), which has only one petal in each flower. On the basis of style length and overall flower size, *C. himalayana* and *C. manipurensis* (= *C. himalayana*) may be more autogamous than Chinese or Japanese plants.

The characters which appear to be taxonomically reliable are leaf size, leaf vestiture (for certain taxa), inflorescence length and vestiture, ovary–hypanthium adnation, absence of free sepals, nectary shape (bifid or truncate), stamen color (for some intraspecific taxa), and petal shape and

size. Because both types of characters are essential, it was found impossible to use only reproductive or only vegetative characters for the identification of corylopses.

PREVIOUS TREATMENTS

Many binomials in *Corylopsis* were established within a relatively short time at the beginning of the twentieth century, when availability of dried material and newly introduced cultivated material from the Far East was at a peak. The description of new taxa represents a slow, uncritical accumulation of information on the variation of these plants, and particularly the *C. sinensis* complex.

Chinese plant explorations enabled William Botting Hemsley (1843–1924) to describe six new taxa in 1906; his "Corylopseos specierum diversarum analyses" in Hooker's *Icones Plantarum* for that year included useful comparative references and illustrations of the species then recognized.

In 1930, Hermann August Theodor Harms (1870–1942) devised the first and only intrageneric classification of *Corylopsis*, recognizing the groups or sections HENRYANAE, MULTIFLORAE, PAUCIFLORAE, SPICATAE, and MANIPURENSES. This classification was based on whether the ovary is fused to the hypanthium or not, whether the sepals are conspicuous or not, petal number, and nectary shape and number. It is clear that Harms had a good appreciation of critical characters in *Corylopsis* so far as the more distinct species are concerned, but he failed to examine the relationships of the more phenotypically similar species. Consequently, his sect. SPICATAE is heterogeneous, containing such phenotypically diverse taxa as *C. spicata*, *C. glabrescens*, *C. stenopetala* (= *C. multiflora*), *C. sinensis*, and *C. himalayana*. His lack of awareness of the variation of *C. himalayana* led him to create a special section for *C. manipurensis* (= *C. himalayana*). To some extent he also contradicted his own classification by placing *C. stenopetala* (= *C. multiflora*) in sect. SPICATAE and not in sect. MULTIFLORAE.

TAXONOMY

Corylopsis Siebold & Zuccarini, Fl. Japon. 1: 45. 1835.

Deciduous shrubs, the branches initially stellate-pubescent; leaves petiolate, the blades ovate to orbicular, cordate to broadly cuneate or oblique at base, conspicuously nerved, the margin serrate to sinuately dentate or denticulate; stipules large and caducous; flowers precocious, usually in catkin-like racemes, axillary on short shoots, the inflorescence bracts concave, membranaceous, brown; floral bracts concave, less membranaceous than the inflorescence bracts, pale brown or transparent to greenish; sepals 5 or inconspicuous, the hypanthium usually adnate to the gynoecium; petals yellow, 5 (rarely reduced to 1), perigynous, clawed, obovate to spathulate; stamens 5, alternate with the 5 bifid or truncate nectaries, the anthers basifixed; ovary semi-inferior to superior, bilocular, styles slender, 2, stig-

mas small and capitate; 1 ovule in each ovary loculus; fruit a subglobose, bivalved, woody capsule, each valve bifid, the calyx normally persistent; seeds black, shiny, oblong-cylindrical, the testa hard. LECTOTYPE SPECIES: *C. spicata* Sieb. & Zucc.

KEY TO THE SPECIES OF CORYLOPSIS

1. Inflorescences with 1–5 flowers; leaves to 6 cm. long; plants diploid, of Japan and Taiwan. ..... 1. *C. pauciflora.*
1. Inflorescences with more than 5 flowers; leaves more than 6 cm. long at maturity.
   2. Ovary free from the hypanthium; floral bracts externally sericeous to glabrous when dry. ..... 2. *C. henryi.*
   2. Ovary fused to the hypanthium; floral bracts externally villose to sericeous when dry.
      3. Sepals apparently absent; nectaries truncate. ..... 3. *C. multiflora.*
      3. Sepals present; nectaries bifid.
         4. Floral bracts externally brown-villose when dry.
            5. Leaves to 10 cm. long; inflorescences 7–8 mm. in diameter, petals 5 or rarely reduced in number to 1. ..... 4. *C. himalayana* var. *himalayana.*
            5. Leaves more than 10 cm. long; inflorescences 10–12 mm. in diameter; petals 5. ..... 4a. *C. himalayana* var. *griffithii.*
         4. Floral bracts externally sericeous or rarely glabrous when dry.
            6. Sepals lanceolate and leafy; flowers often fewer than 10, clustered toward the tip of the rachis; plants hexaploid, of Japan. ..... 5. *C. spicata.*
            6. Sepals shortly ovate and fleshy; flowers often more than 10, distributed evenly along the rachis; plants diploid, tetraploid, or hexaploid, of Japan and China.
               7. Sepals bluntly triangular, about 1 mm. long; inflorescence ca. 8 mm. in diameter; flowers widely spaced on the glabrous rachis; leaves ca. 8 cm. long at most, the abaxial veins sericeous to glabrescent; plants tetraploid or hexaploid, of Japan and Korea. ..... 6. *C. glabrescens.*
               7. Sepals ovate to triangular, ca. 2 mm. long; inflorescence ca. 10 mm. in diameter; flowers closely spaced on a pubescent, sericeous, or glabrous rachis; leaves to ca. 12 cm. long, the abaxial veins pubescent or sericeous, or if rachis glabrous and glaucous, the veins glabrous.
                  8. Leaves with the abaxial lamina pubescent between veins, rarely glabrous, often roughly reticulate with pronounced secondary veins; petioles densely adpressed-pilose to tomentose, the rachis tomentose to coarsely pilose, rarely glabrous as in var. *calvescens*; plants diploid or tetraploid, of China. ..... 7. *C. sinensis* var. *sinensis.*
                  8. Leaves with the abaxial lamina glabrous between the veins, smooth with inconspicuous secondary veins; petioles glabrous to sparsely adpressed-pilose, sometimes glandular; plants diploid or hexaploid, of China. ..... 7a. *C. sinensis* var. *calvescens.*

1. **Corylopsis pauciflora** Sieb. & Zucc., Fl. Japon. 1: 48. *t. 20.* 1835; Hooker, Curtis's Bot. Mag. 126: *t. 7736.* 1900. HOLOTYPE: *Siebold s.n.* (L or LE), not seen.

Corylopsis Matsudai Kanehira & Sasaki, Trans. Nat. Hist. Soc. Formosa **20**: 383. 1930. HOLOTYPE: *Matsuda 12* (TAI!).[1]

Spreading, much-branched shrub to 3 m.; young shoots slender, glabrous; petiole 5–15 mm. long, glabrous; leaves ovate, 3–6.5 cm. long, acute at apex, cordate to subcordate at base, oblique, the margin sinuate-dentate with bristle-like, excurrent teeth; abaxial surfaces of the leaf blades glaucescent, sparsely sericeous on the 5 to 9 pairs of veins; inflorescence 2–3 cm. long, ca. 8–10 mm. in diameter, the rachis glabrous to sparsely sericeous and the bracts externally glaucous, glabrous, and reddish; flowers 1 to 5, yellow, the floral bracts externally glabrous to sericeous; sepals 2 mm. long, orbicular, glabrous; petals 7–8 mm. long, oblong-obovate; anthers pale yellow, the filaments yellowish; ovary fused to the glabrous hypanthium, the style yellowish, the 5 nectaries entire and truncate, shorter than the sepals; capsules glabrous, 6–8 mm. in diameter.

LOCAL NAMES. Hyūga-mizuki, Lyo-mizuki (Ohwi, 1965).

REPRESENTATIVE SPECIMENS. **Korea.** KYENGKI: Seoul, 1933, Smith, 9–30 (A). **Japan.** HONSHU: Mt. Kimiosan, *Murata 19245* (K); Komatsu-shi, *Takahashi s.n.* (A); Fuchu in Musashi, *Mizushima 1127* foliage = *1016* flowers (K, E); Mt. Oeyama in Tango Prov., *Togasi 1513* (K), *Tashiro 953* (E); Yokohama hort., *Bisset 1086* (BM, E, K); "Hondo," without further locality, *Wilson 6323* (K). KYUSHU: Nagasaki hort., *Maximowicz 10006* (BM), Nagasaki, *Maximowicz s.n.* (K), March, 1900, *Veitch s.n.* (K); Kyushu, without further locality, *Wilson 6230* (BM). **Taiwan:** Mokwazan, *Nakamura 4558* & *5248* (TAI); Tenchozen, *Matsuda 12* (TAI); Ching-sui Shan, *Shimizu & Kao 11736* (TAI).

Corylopsis pauciflora was introduced to Britain by Messrs. Veitch sometime prior to 1900; as their catalogues of the early 1900's indicate, their firm helped to make this species well known in gardens. According to Dr. Li (1962), Dr. G. R. Hall introduced the species to North America (Rhode Island) in 1874; Bretschneider (1898) pointed out that Robert Fortune made the first non-commercial introduction of the species to Britain in 1860–61, and also noted that a year later it was being grown in Leningrad after having been introduced there by Maximowicz.

A delicate little shrub which is still commercially available, *Corylopsis pauciflora* is suited for the small or shaded woodland garden, as it tends to become scorched when planted in dry or exposed situations, and chlorotic in limey soils. It is said to be less hardy than species such as *C. spicata* in the British Isles (see FIGURE 4). Field notes on *C. pauciflora* in Japan by Y. Shirosaki can be found in Jour. Jap. Bot. **28**: 95 (1953).

[1] The only collection cited by Kanehira and Sasaki as representing *Corylopsis Matsudai* was *Matsuda 21866. Ed.*

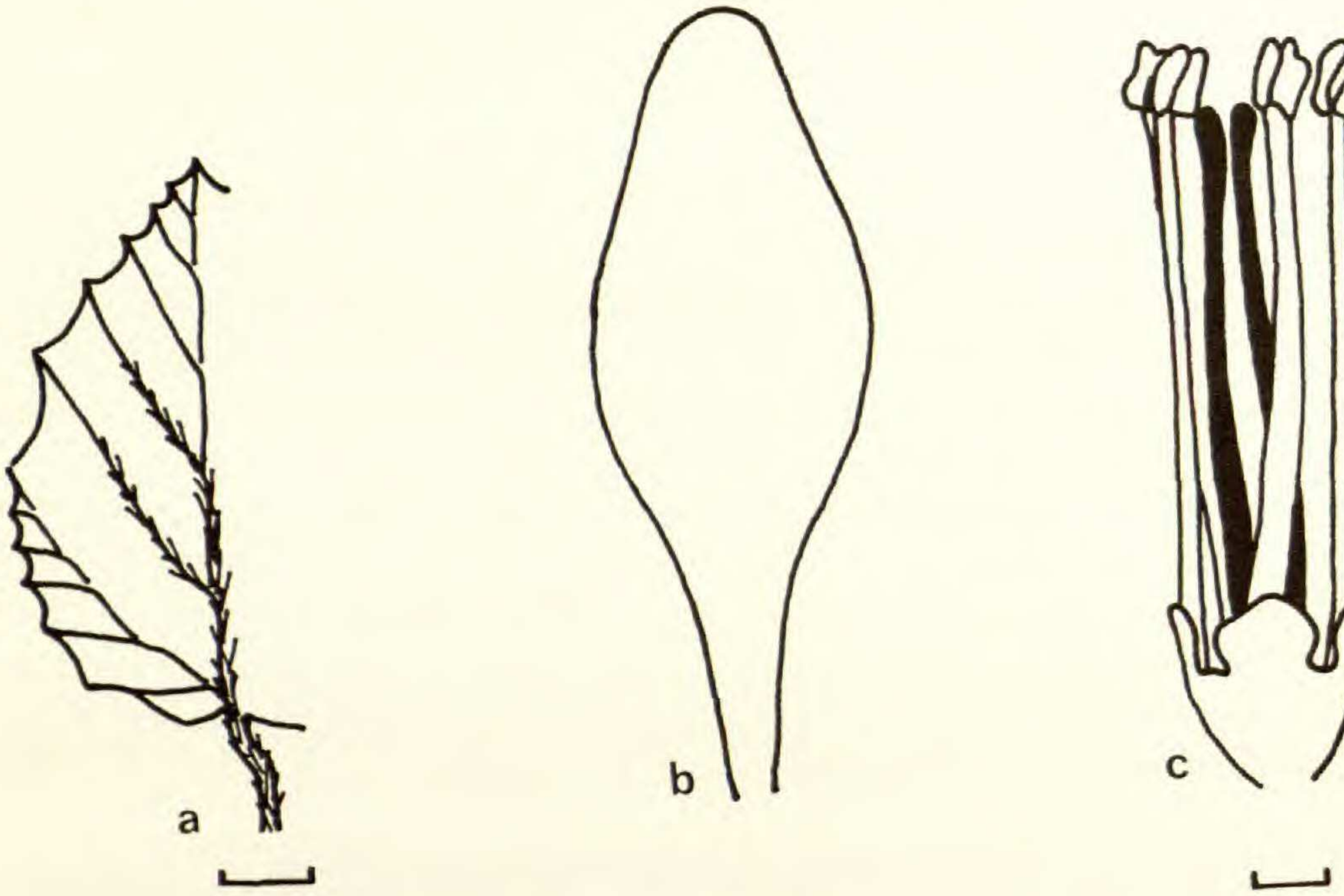


FIGURE 4. **Corylopsis pauciflora:** a, leaf profile showing abaxial vestiture (*Veitch s.n.*, type of Curtis's Bot. Mag. **126:** *t. 7736*); b, petal; c, flower lacking petals (flowers cultivated in Glasnevin as *C. pauciflora*). Bar scale by leaf in all cases = 1 cm.; bar scale for flowers, including petals, in all cases = 1 mm.

2. **Corylopsis henryi** Hemsley, Hooker's Icon. Pl. **29**: *tt. 2819, 2820.* 1906. HOLOTYPE: *Henry 1444* (K!).

Corylopsis stelligera Guillaumin, Bull. Soc. Bot. France **61:** 38. 1914; Lecomte, Not. Syst. **3:** 25. 1914. HOLOTYPE: *Farges 137* (P?), not seen.

Corylopsis brevistyla Chang, Sunyatsenia **7:** 71. 1948. ISOTYPES: *Maire 153* (BM!, E!).

Shrub to small tree with slender, glabrous shoots; leaves not seen in mature state; inflorescence ca. 4 cm. long, the rachis glabrous to villose; flowers 10 to 18, yellow, the bracts externally glabrous to villose; sepals ca. 2 mm. long, ovate-oblong, glabrous to pilose; petals 6–8 mm. long, spathulate to suborbicular; stamens not seen fresh; ovary free or only slightly fused to the glabrous or pilose hypanthium, the style not seen fresh, the nectaries 5, bifid, tips acute to obtuse, shorter than the sepals; capsules not seen.

REPRESENTATIVE SPECIMENS. **China.** HUPEH: Patung, *Henry 1444* (K). YUNNAN: Ho ki keou, *Maire 51037 (153)* (BM, E).

The floral structure of *Corylopsis henryi* is so distinctive that the species was described in the absence of mature leaves. *Corylopsis brevistyla* was also described only from flowering material; from written descriptions we see that it apparently has the free ovary character of *C. henryi.* It differs,

however, in having villose instead of subglabrous floral bracts and inflorescences, orbicular instead of spathulate petals, and bifid, blunt-tipped instead of sharply tipped nectaries.

While floral morphology seems to place *Corylopsis henryi* and *C. brevistyla* together, and the latter is tentatively placed in the synonymy of *C. henryi* here, more material is needed to determine their full relationship and the reliability of the free ovary character. *Corylopsis stelligera*, also here placed tentatively in the synonymy of *C. henryi*, reputedly differs from *C. henryi* (including *C. brevistyla*) in having an externally pilose hypanthium and exserted anthers. Although we have not seen type material (*Farges 137*, Sut-chuen, Tchen-keou-tin district) which consists of both flowers and fruits, the description states that the ovary and hypanthium are not adnate. Again, more material from the type locality of *C. stelligera* would improve our understanding of this taxon. *Corylopsis henryi*, as construed here, does not appear to have been introduced into cultivation (see FIGURE 5).

3. **Corylopsis multiflora** Hance, Ann. Sci. Nat. ser. 4. **15**: 224. 1861. HOLOTYPE: *Hance 6684* (BM!); isotype (K!).

Corylopsis wilsonii Hemsley, Hooker's Icon. Pl. **29**: *t. 2819*. 1906. HOLOTYPE: *Wilson 18* (K!); *isotype* (GH!).

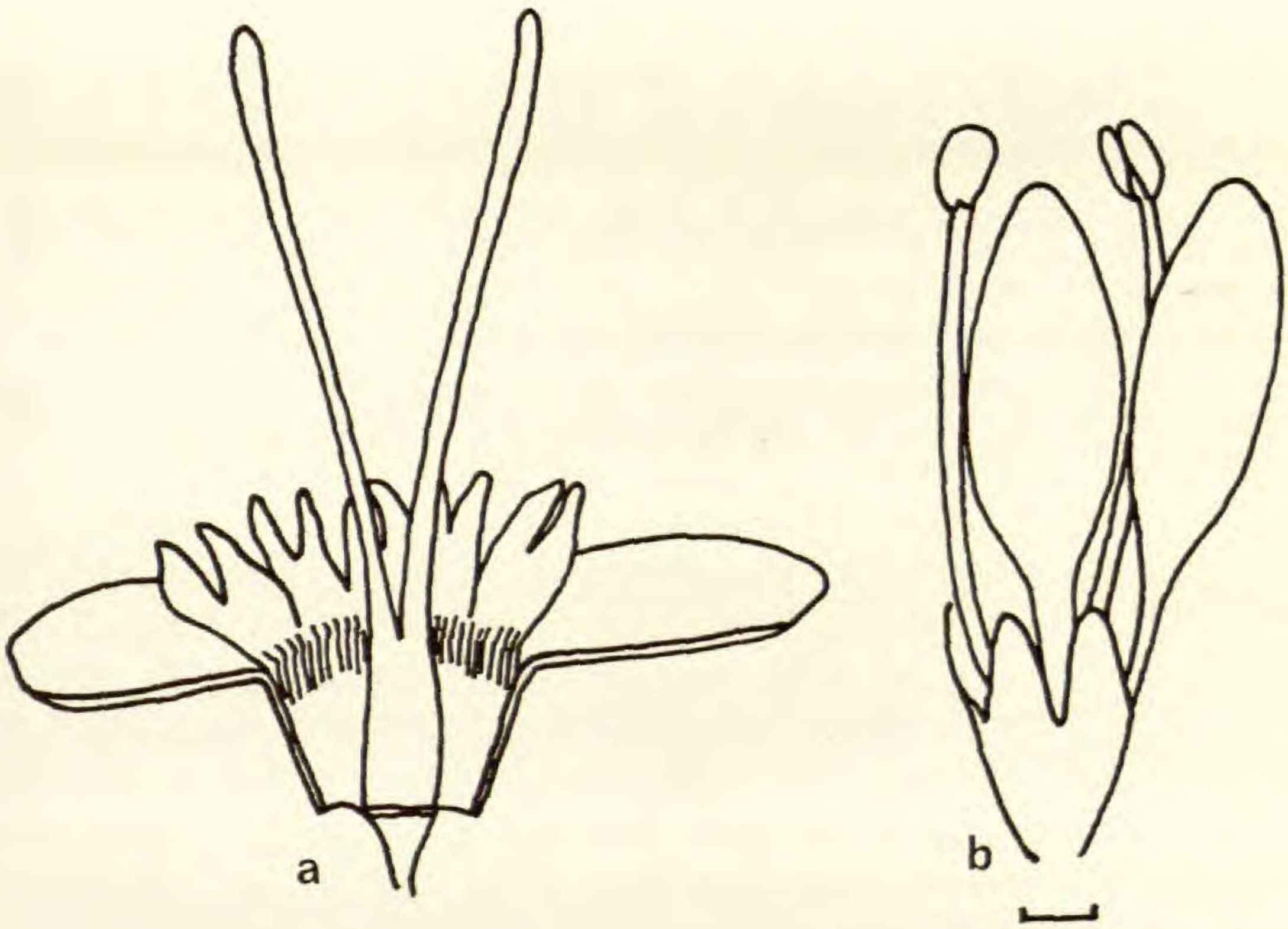


FIGURE 5. **Corylopsis henryi:** a, flower dissected to show free ovary; b, flower with two petals (a, b after Smith in Hooker's Icon. Pl. **29**: *t. 2820, figs. 15, 16*, originally drawn from the holotype, *Henry 1444*).

Corylopsis cavaleriei Léveillé, Feddes Repert. **11:** 295. 1912. ISOTYPES: *Cavalerie 1098* (E!, K!).

Corylopsis stenopetala Hayata, Icon. Pl. Formosa. **4:** 6. 1914. HOLOTYPE: *Ito s.n.* (TI), not seen.

Corylopsis cordata Merrill ex Li, Jour. Arnold Arb. **24:** 445. 1943. ISOTYPE: *Tsang 22261* (BM!).

Shrub or small tree with stellate-pubescent or villose young shoots; petiole 1–2.5 cm. long, densely pubescent to villose; leaves ovate to obovate, or ovate-lanceolate to elliptic, acute or caudate at tip, cordate to truncate at base, 7–15 cm. long, the margin sinuate-dentate with or without bristle-like, excurrent teeth; abaxial surfaces of the leaf blades glaucous and pubescent-tomentose, more rarely glabrous with villose veins or entirely glabrous, the veins in 6 to 9 pairs; inflorescence 2.5–7 cm. long, 1–1.3 cm. wide, the rachis pubescent to tomentose and the bracts externally pale brown-lanate; flowers 10 to 20, yellow, the bracts externally sericeous to pale brown and silvery-lanate; sepals inconspicuous; petals 5–6 mm. long, linear-spathulate; stamens not seen fresh; ovary fused to the glabrous hypanthium, the styles not seen fresh, the nectaries 5, entire, thick and truncate; capsule glabrous, 7–12 mm. in diameter.

REPRESENTATIVE SPECIMENS. **China.** FOKIEN: Ankoe, legit. de Grijs, *Hance 6684* (BM, K). KWEICHOW: Pin-fa, *Cavalerie 1098* (E, K); Pin-fa, Lofou, *Cavalerie 2927* (E, K); Pai Sha Chi, Fan Ching Shan, *Steward et al. 722* (BM, K); Sandjio, *Handel-Mazzetti 10797* (K). HUPEH: Patung, *Wilson 1781* (K), *Wilson 18 = 1166* (GH, K); Enshih Hsien, *Chow 1852* (E). KWANGTUNG: near Chengkou, *Chun 5820* (A, E, K); Pan Ling Tsze, *Chun 5855* (E); Lok Chong, *Tso 20516* (A); Shap Man Taai Shan, border with Shangtze, *Tsang 22261* (BM). KWANGSI: Pan-pu-ts'un, Pai Shou, *Ying-wah 73* (K); Lao Pao k'ou, *Steward et al. 1095* (A); Bin Long, *Ching 6038* (A).

Steward et al. 722, *Chun 5855*, and other specimens have notably glaucous undersides to the leaves.

Both *Corylopsis multiflora* and plants segregated as *C. wilsonii* by Hemsley have thick, truncate nectaries and lack conspicuous sepals; this fact may be seen in the illustrations in Hooker's *Icones Plantarum, tt. 2819* and *2820*. In our opinion, these attributes render *C. wilsonii* synonymous with *C. multiflora*. *Corylopsis cavaleriei* was described in the absence of flowers (as was *C. cordata*); on the basis of leaf characters, the type of *C. cavaleriei* is placed in synonymy with *C. multiflora*. Neither the broader and more glabrous leaves of an isotype specimen of *C. cordata*, nor the shorter fruiting inflorescences and smaller fruits of the taxon, are thought to be sufficiently different from *C. multiflora* to warrant specific recognition. *Corylopsis cordata* is accordingly placed in the synonymy of *C. multiflora*. I (B. M.) have not examined specimens (*Tsang 24256* and *24747*) that are reputed to be labeled as *C. cordata*.

Known from Taiwan, plants recognized by Hayata as *Corylopsis stenopetala* are familiar to me (J. C.) (the type, collected by Ito in January, 1913, comes from Shinshikei). A flowering specimen, it has been likened

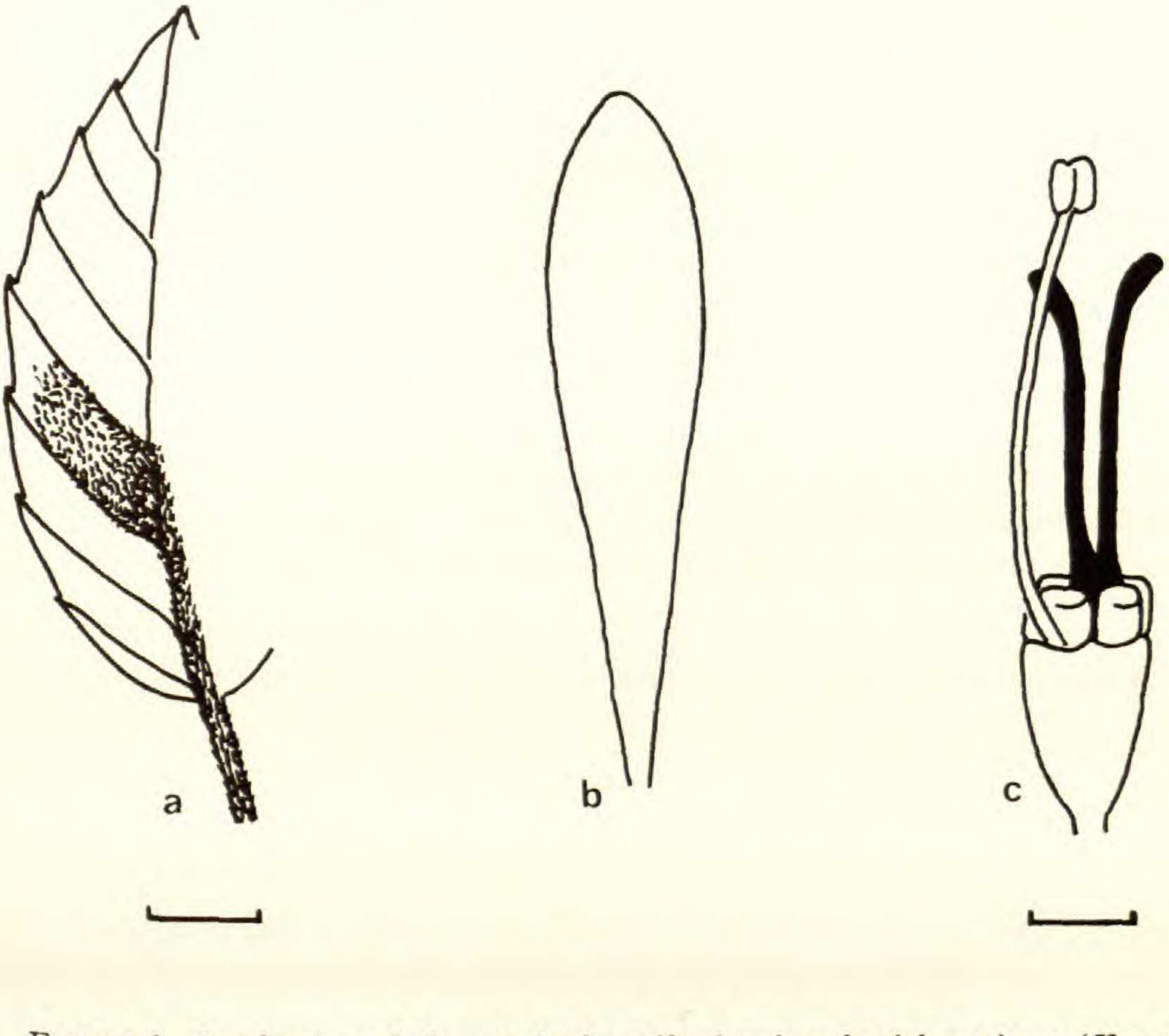


FIGURE 6. **Corylopsis multiflora:** a, leaf profile showing abaxial vestiture (*Hance 6684*, holotype); b, petal; c, flower with one stamen showing nectaries and styles (b, c after Smith in Hooker's Icon. Pl. **29:** *t. 2819*).

to *C. veitchiana*, but is clearly synonymous with *C. multiflora* and cannot be accepted as a distinct species.

The eighth edition of Bean (1970) takes over unchanged the entry for *Corylopsis* that appeared in the first edition of that work and lists *C. wilsonii* as cultivated in Britain. Both Rehder's *Manual* (1940) and Hillier's *Manual* (1974) include the species, but I (B. M.) have never seen material growing and doubt if *C. wilsonii* or *C. multiflora* are still in cultivation. As interpreted here, *C. multiflora* was introduced from Central China by E. H. Wilson for Messrs. Veitch in 1900 (see FIGURE 6).

4. **Corylopsis himalayana** Griffith, Jour. Asiatic Soc. Bengal **23:** 64. 1854; Hooker's Icon. Pl. **29:** *t. 2820*. 1906. HOLOTYPE: (*teste* Hemsley, 1906), *Griffith 593*, Tongsa, Bhutan (K).

4a. **Corylopsis himalayana** Griffith var. **himalayana.**

Corylopsis grata Griffith, Jour. Asiatic Soc. Bengal **23:** 64. 1854.
Corylopsis manipurensis Watt ex Hemsley, Hooker's Icon. Pl. **29:** *tt. 2819, 2820.* 1906. HOLOTYPE: *Watt 6434* (K!); isotype (E!).

Shrubs or small trees with pubescent or stellate-tomentose shoots; petioles glabrous, stellate-tomentose, or stipitate glandular, 3–4 cm. long; leaves ovate to ovate-lanceolate with acute apices and cordate to cuneate bases, the margins sinuate-denate, usually with bristle-like, excurrent teeth, 8–10 cm. long; abaxial surfaces of the leaf blades sericeous to brown tomentose or glabrous but pubescent-tomentose on the 8 to 12 pairs of veins; inflorescence 4–6 cm. long, 8–9 mm. in diameter, the rachis stellate-pubescent or tomentose; inflorescence bracts externally dark red-brown, glabrous; floral bracts externally glabrous to sericeous, usually pale brown-lanate; flowers 15 to 30, pale yellow, the sepals ca. 2 mm. long, ovate-elliptic, glabrous or pubescent; petals ca. 6 mm. long, obovate to elliptic, sometimes reduced to 1 in number; stamens and styles not seen fresh, nectaries 5, about as long as the sepals, bifid or deeply bifid, the stamens much shorter than the petals; ovary adnate to the pubescent hypanthium; capsules ± pilose, ca. 7–9 mm. in diameter.

LOCAL NAME. Pu-uir symrang. The flowers are cooked and eaten by local inhabitants in parts of the Himalayas (von Reis Altschul, 1973).

REPRESENTATIVE SPECIMENS. **India.** ASSAM: Bishops Falls, *Clarke 37381A* (BM); Shillong, *Ruse 3* (A); Chenna poory, *Gallatly 665* (BM); Chibaon Delei Valley, *Kingdon-Ward 8030* (K), *King s.n.* (K); Khasya, no further locality, *Hooker & Thomson s.n.* (E, K). MANIPUR: Sirohifurar, *Watt 6434* (E, K). **India-Burma:** Ngawchang Valley, *Kingdon-Ward 330* (A, BM); Sirhoi, *Kingdon-Ward 18261* (A, BM), *Kingdon-Ward 17205* (A, BM). **Bhutan:** Chukka-Chapcha Timpu, *Cooper 1316* (BM, E), *Griffith 3378* (K); Tongsa, *Cooper 2277* (BM, E); 26° N 92′ E, *Kingdon-Ward 6446* (K); Batte Dzong, *Ludlow et al. 16067* (BM, E); Satsalor-Diwangiri, *Ludlow et al. 1125* (BM, E), *Griffith s.n.* (K).

Corylopsis manipurensis was described in manuscript as a variety of *C. himalayana* by Sir George Watt, its discoverer, during the British Demarcation Survey of the eastern frontier of India in 1881–1882. As seen in *Watt 6434*, the reputed new taxon differed from *C. himalayana* by the occurrence of a single petal in each of the flowers. However, *C. himalayana* is now known to be polymorphic for petal length and number (e.g., *Ludlow et al. 1125* and *Kingdon-Ward 330*); the validity of *C. manipurensis* as a species is therefore doubted. The variability of the small elliptic leaves of *C. manipurensis* with an abaxial vestiture or glabrous lamina and pubescent veins, however, is not known. More collections and field observations are required. Plants corresponding to *C. manipurensis* are not commercially available and would probably be tender if grown in British gardens (see FIGURE 7, a–c, e, f).

Although Dr. King introduced seed of *Corylopsis himalayana* var. *himalayana* to Kew in 1879, and subsequent introductions were made by Messrs. Veitch, the variety was rare in cultivation (Goldring, 1889) and these stocks may now be lost in cultivation. Seed was sent to Glasnevin in 1972

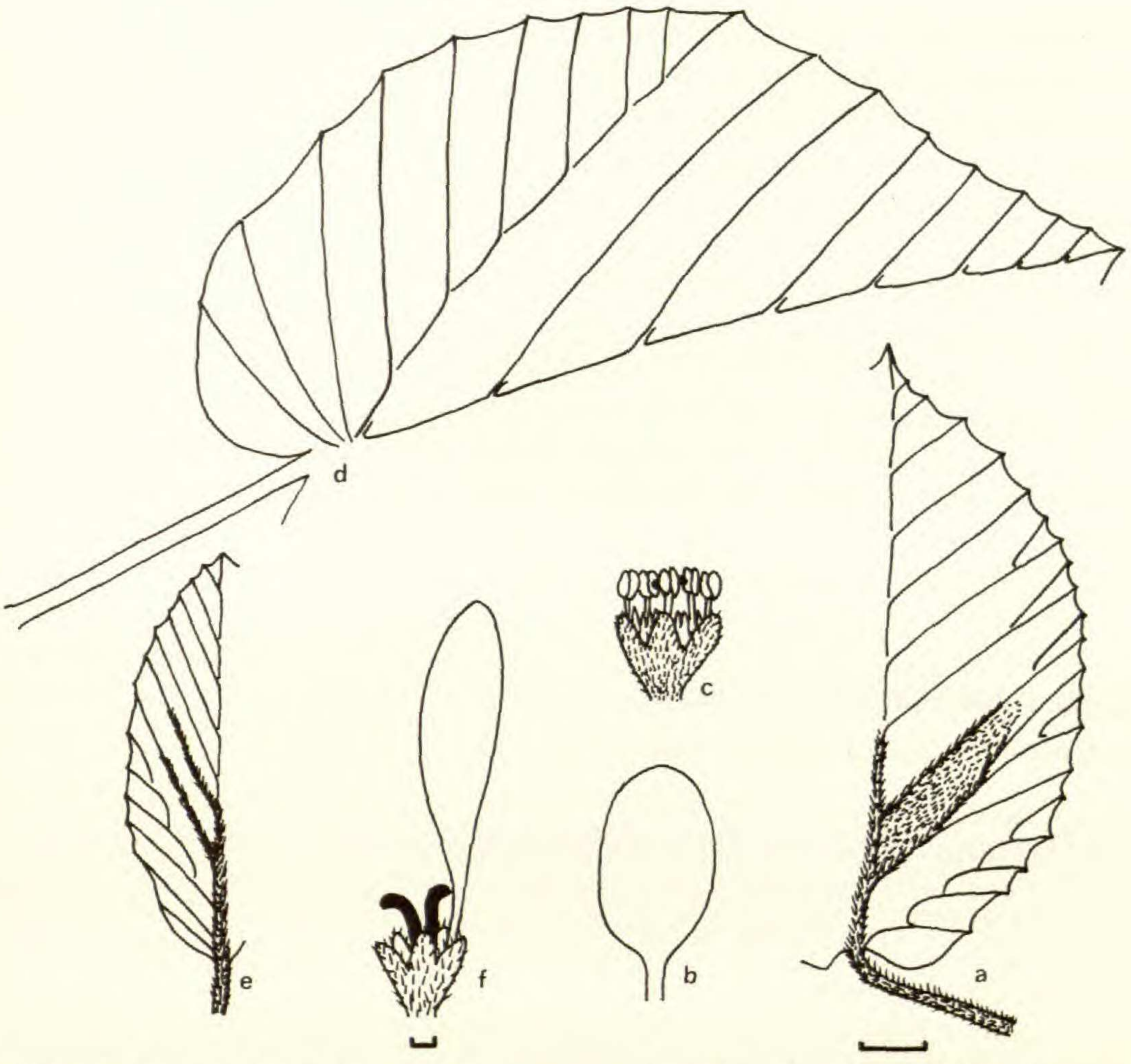


FIGURE 7. **Corylopsis himalayana.** a–c, e, f, *C. himalayana* var. *himalayana*: a, leaf profile showing abaxial vestiture (*Forrest 7802*); b, petal; c, flower without petals; e, leaf profile showing abaxial vestiture (*Kingdon-Ward 8030* as *C. manipurensis*); f, flower with only one petal (b, c, f after Smith in Hooker's Icon. Pl. **29**: *t. 2820*). d, *C. himalayana* var. *griffithii*: leaf profile (*Hooker & Thomson s.n.*).

by Dr. A. S. Rao of Shillong, and seedlings have been distributed to the major botanical gardens in the British Isles in an effort to re-establish the species in cultivation, if only in conservatories.

4b. Corylopsis himalayana Griffith var. **griffithii** (Hemsley) Morley & Chao, The Garden **102**(3): 106. 1977. BASIONYM: *Corylopsis griffithii* Hemsley, Gard. Chron. ser. 3. **39**: 19. 1906; Hooker, Curtis's Bot. Mag. **110**: *t. 6779*. 1884. HOLOTYPE: *Hooker & Thomson s.n.* (K!) (*teste* Hemsley, 1906, Bogu Panee, Khasya); isotype (BM!).

Plants that differ from *Corylopsis himalayana* var. *himalayana* in their larger leaves, the petioles to 6 cm. long and the blades to 20 cm. long with up to 17 pairs of veins, and by their larger inflorescences to 9 cm. in length and to ca. 13 mm. in diameter, are recognized here as *Corylopsis himalayana* var. *griffithii*.

William Griffith noted that *Corylopsis himalayana* was variable when he observed that differences existed between plants in Khasya and Bhutan. Recognition here of var. *griffithii* is based on size differences between the leaves and inflorescences of plants of *C. himalayana*. *Corylopsis himalayana* var. *griffithii* was introduced into cultivation in Europe by Dr. King, who sent seed to Kew in 1879, and later by Messrs. Veitch, who also introduced seed. Plants of var. *griffithii* are said to require the protection of a wall in Britain, but I (B. M.) know of no living specimens. It is not commercially available (see FIGURE 7, d).

REPRESENTATIVE SPECIMENS. **India.** ASSAM: Khasya, Mahlangwar, *Clarke 14675* (BM), *Hooker & Thomson s.n.* (BM, K); above Myrung, *Simons 112* (K), Herb. *Dresden s.n.* (A). **Burma-Tibet:** Adung Valley, *Kingdon-Ward 9281* (A, BM).

5. **Corylopsis spicata** Sieb. & Zucc., Fl. Japon. 1: 47. *t. 19*. 1835; Hooker, Curtis's Bot. Mag. 90: *t. 5458*. 1864. TYPES: *Siebold s.n.* (LE or L), not seen; *Siebold s.n.* (Herb. Zuccarini, 1843), Japan (K!).

Corylopsis kesakii Sieb. & Zucc., *op. cit.* 49.

Shrubs to ca. 3 m. with pubescent young shoots; petioles pubescent, 1–2.5 cm. long; leaves 4–11 cm. long, ovate to obovate with shortly acuminate apices, obliquely rounded to cordate bases, and sinuately dentate margins with bristle-like, excurrent teeth; abaxial surfaces of the leaf blades glaucous and densely pubescent, especially on the 6 to 8 pairs of veins; inflorescence 4–6 cm. long, ca. 1.2–1.5 cm. in diameter, the flowers clustered toward the distal end, the rachis pubescent, the inflorescence bracts glaucous, glabrous and reddish externally; floral bracts externally glabrous to sericeous at the margins; flowers 5 to 12, yellow, the sepals 3–4 mm. long, foliose, ovate-lanceolate, glabrous; petals 7–9 mm. long, obovate-spathulate; stamens with pink filaments, the anthers brown, purple, or red; nectaries 5, shorter than the sepals, bifid, with acute tips; ovary adnate to the pubescent brown hypanthium, the styles green; capsules pubescent, 7–8 mm. in diameter.

LOCAL NAME. Tosa-mizuki (Ohwi, 1965).

REPRESENTATIVE SPECIMENS. **Japan.** SHIKOKU: Nishikiyama Hill, Pref. Kochi, *Murata 17913* (E, K); Nangoku-shi, *Ohashi s.n.* (A), *Faurie 11919* (K). HONSHU: Central Mountains, *Maries s.n.* (K), *Wilson 6323* (BM); Yokohama, *Bisset s.n.* (BM); Yokohama hort., *Bisset 1722* (E), Herb. *Drake s.n.* (K); Mino Prov. *Shiota 8318* (A), *Shiota 7430* (flowers) & *3325* (leaves) (A); Kobe, *Muroi 270* (A). KYUSHU: Nagasaki hort., *Maximowicz 9995* (BM); Nagasaki, *Maximowicz s.n.* (GH, K), *Wilson 6230* (K); Rokugawa hort., *Bisset 1723* (BM, K). JAPAN, without further locality, *Siebold s.n.* (Herb. Zuccarini, 1843, K).

According to Bretschneider (1898), Robert Fortune introduced *Corylopsis spicata* to England in 1860 or 1861, and Messrs. Veitch made commercial introductions from Yokohama in 1863. *Corylopsis spicata* is one of the first corylopses to flower each spring in western Europe, which is compensation for its rather untidy inflorescences, characteristically brac-

teate but flowerless in the upper part with flowers concentrated at the free end of the rachis. The petals are spathulate and the sepals somewhat leafy, characters which distinguish the species from the continental *C. sinensis*, which also has pubescent undersides to the leaves. *Corylopsis spicata* is widespread in cultivation at present and is still commercially available (see FIGURE 8).

6. **Corylopsis glabrescens** Franchet & Savatier, Enum. Pl. Jap. **2:** 367. 1878. HOLOTYPE: *Rein s.n.* (P), Satzuma Prov., Japan, not seen.

Corylopsis gotoana Makino, Bot. Mag. Tokyo **15:** 111. 1901. SYNTYPE: *Goto s.n.* (MAK or TI?), Kiso, Shinano Prov., Japan, not seen.

Corylopsis coreana Uyeki, Suigen Gakuho. No. **41.** 1924; Jour. Chosen Nat. Hist. Soc. **20:** 15. 1935.

Shrubs to ca. 6 m., the young shoots glabrous; petioles 1.5–3 cm. long, sparsely sericeous, in age often glabrous; leaves 3–8 cm. long, ovate to suborbicular with acuminate apices, obliquely cordate to subcordate bases, and sinuate-dentate margins with excurrent, bristle-like teeth; abaxial surfaces of the leaf blades glaucescent, sparsely sericeous on the 7 to 12 pairs of veins; inflorescences 2–5 cm. long, ca. 8 mm. in diameter, the rachis glabrous; inflorescence bracts glabrous, glaucous, and reddish externally;

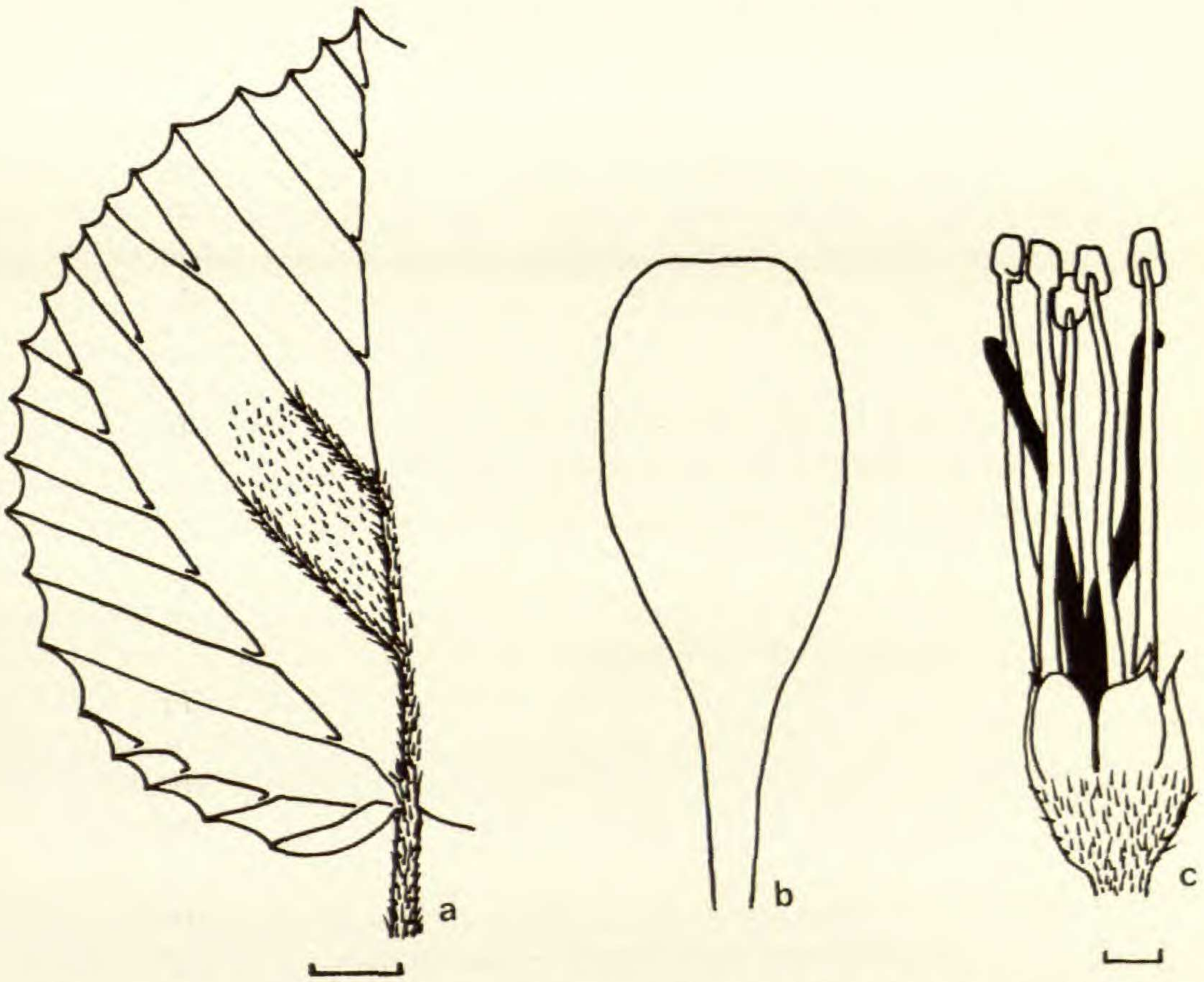


FIGURE 8. **Corylopsis spicata:** a, leaf profile showing abaxial vestiture (*Bisset 1723*); b, petal; c, flower without petals (flowers cultivated in Glasnevin as *C. spicata*).

floral bracts glabrous to sparsely sericeous; flowers 10 to 22, yellow, widely but evenly spaced along the rachis; sepals ca. 1 mm. long, obtusely triangular, fleshy and glabrous; petals to 8 mm. long, orbicular to obovate; stamens with yellow filaments, the anthers yellow or purple, the 5 nectaries longer than the sepals, bifid with obtuse tips, greenish, sometimes purplish; ovary adnate to the glabrous hypanthium, the styles green; capsules glabrous, 6–8 mm. in diameter.

LOCAL NAMES. Kirishima-mizuki, Kōya-mizuki, Miyama-Tosa-mizuki, (Ohwi, 1965).

REPRESENTATIVE SPECIMENS. **Japan.** KYUSHU: Mt. Kirishima, *Tashiro s.n.* (K), *Wilson 6230* (A); Mt. Kirishima, *Naito 123* (A); Satzuma Prov., *Rein s.n.* (P), not seen. HONSHU: near Otake, *Wilson 7763* (A, K), *Wilson 7032* (A, K); Mt. Aterayama, *Murata & Iwatsuki 908* (E, K). **Korea:** Sinto Village, Okayama Pref., *Muroi 1032* (A).

Corylopsis gotoana, here placed in the synonymy of *C. glabrescens*, commemorates Suekichi Goto, a former assistant in the Dendrology Institute of the Imperial University of Tokyo. Goto collected a syntype of *C. gotoana* and Makino described the taxon in the absence of flowers. Plants of *C. gotoana* are stated by Ohwi (1965) to differ from those of *C. glabrescens* in the length of the stamens and in the margins of the leaves, but these differences are not considered here to warrant specific recognition. Moreover, the type description of *C. coreana* closely resembles that of *C. glabrescens*, and *C. coreana* is tentatively made synonymous. According to Li (1962), Professor J. G. Jack first introduced *C. glabrescens* into North America in 1905. It was subsequently introduced to Kew in 1916 and is still commercially available, being widely cultivated under a variety of names, including *C. gotoana* and *C. platypetala* (see FIGURE 9).

7. **Corylopsis sinensis** Hemsley, Gard. Chron. ser. 3. **39**: 18. 1906. HOLOTYPE: *Wilson 691* (K!).

7a. **Corylopsis sinensis** Hemsley var. **sinensis.**

Corylopsis glandulifera Hemsley, *op. cit.* 18. 1906. HOLOTYPE: *Maries s.n.* (K!).

Corylopsis yunnanensis Diels, Notes Bot. Gard. Edinburgh **5**: 226. 1912. HOLOTYPE: *Forrest 4095* (E!); isotypes (GH!, K!).

Corylopsis sinensis Hemsley var. *glandulifera* (Hemsley) Rehder & Wilson, Pl. Wilsonianae **1**: 424. 1913.

Corylopsis willmottiae Rehder & Wilson, Pl. Wilsonianae **1**: 425. 1913. HOLOTYPE: *Wilson 1316* (AAH!); isotypes (E!, K!).

Corylopsis velutina Hand.-Mazz., Anz. Akad. Wiss. Wien Math. Nat. **62**: 130. 1925. ISOTYPE: *Handel-Mazzetti 1810* (E!).

Corylopsis willmottiae Rehder & Wilson var. *chekiangensis* Cheng, Contr. Biol. Lab. Sci. Soc. China **10**: 125. 1936. HOLOTYPE: *Chen 2772* (PE?), Yunho, Chekiang, not seen.

Corylopsis polyneura Li, Jour. Arnold Arb. **25**: 299. 1944. HOLOTYPE: *Wang 66783* (PE!), photograph seen.

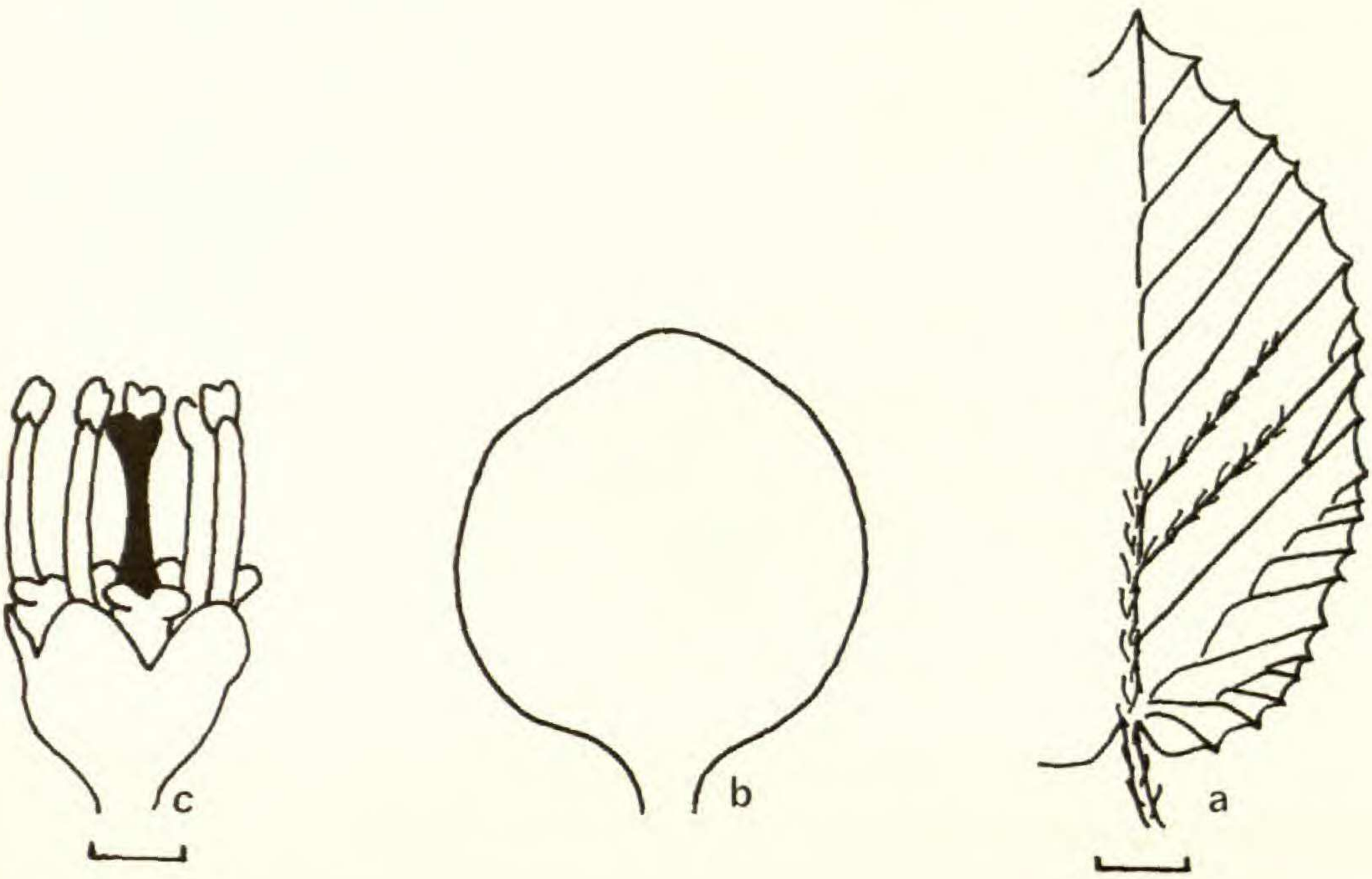


FIGURE 9. **Corylopsis glabrescens:** a, leaf profile showing abaxial vestiture (*Tashiro s.n.*); b, petal; c, flower without petals (flowers cultivated in Glasnevin as *C. gotoana*).

Corylopsis obovata H. T. Chang, Sunyatsenia **7**: 72. *t. 13.* 1948. HOLOTYPE: *Ho 51313* (PE?), Yinkiang, Fanching Shan, not seen.

Corylopsis trabeculosa Hu & Cheng, Bull. Fan Mem. Inst. Biol. Peiping **1**: 192. 1948. HOLOTYPE: *Yu 21059* (PE!), photograph seen; isotypes (A!, E!).

Corylopsis yui Hu & Cheng, Bull. Fan Mem. Inst. Biol. Peiping **1**: 193. 1948. HOLOTYPE: *Yu 19509* (PE!), photograph seen; isotypes (A!, E!).

Shrubs to 5 m. with glabrous or villose (and then, eventually glabrous) young shoots; petioles 5–15 mm. long, glabrous and glaucous or usually sericeous-pubescent, rarely glandular; leaves 5–12 cm. long, obovate to oblong-elliptic, with acuminate apices, obliquely cordate to subcordate or rounded bases, and sinuately dentate margins with bristle-like, excurrent teeth; abaxial surfaces of the leaf blades sericeous to densely brown-pubescent, rarely pubescent only on the 7 to 12 pairs of veins or brown-to-mentose throughout, the lamina often with secondary reticulate veins; inflorescence 2–9 cm. long, ca. 1 cm. in diameter, with the rachis sericeous to densely pubescent; inflorescence bracts externally glabrous and glaucous to sparsely pubescent and dark brown; floral bracts externally pubescent to sericeous, rarely glabrous; flowers 6 to 35, yellow, evenly and densely spaced along the rachis; sepals fleshy, 0.5–1.5 mm. long, obtusely triangular to ovate, glabrous, pilose, or ciliate at the margin; petals 7–8 mm. long, orbicular to suborbicular; stamens with greenish filaments, the anthers yellow; nectaries 5, longer than the sepals, bifid, sometimes deeply so, the tips acute; ovary adnate to the pubescent or glabrous hypanthium, the styles greenish; capsules pubescent to subtomentose, rarely glabrous, 6–9 mm. in diameter.

REPRESENTATIVE SPECIMENS. **China.** KIANGSI: Kuling, *Wilson 1556* (BM, E); Lu Shan, *Chung & Sun 182* (A); Kiukiang, *Maries s.n.* (K), *Carles s.n.* (E), *Faber 929* (K); Lu Shan, *Steward 2473* (A, E, K). HUPEH: Changyang, *Wilson 691* (K), *Wilson 65* (A, K); Chienshih, *Henry 5854* (K). HUNAN: Hsinhwa, *Handel-Mazzetti 11771* (E, K). SZECHUAN: Tachienlu, *Wilson 1316* (AAH, E, K), *Wilson 4406* (K); Mupin, *Wilson 4224* (K); Techang, *Schneider 753* (K); Sungpan hsien, *Fang 4180* (E, K); Hanyuan hsien, *Fang 3750* (E, K). WESTERN SZECHUAN-TIBET: *Pratt 85* (E, GH, K). CHEKIANG: Tienmushan, *Liou 255* (K). ANHWEI: Wangsi che, *Ching 2849* (E, K); Wang shan, *Ching 3064* (K); Chu Hwa Shan, *Ching 2598* (K), *Chang 1694* (K). YUNNAN: Doker-la, *Forrest 17174* (E, K); Tengyueh-Likiangfu, *Rock 8127* (A); Tali, *McClaren C26* (A), *Delavay 4729* (K), *Forrest 13516* (E, K), *Schneider 2794* (A, K); Mt. Isang, Tali, *Delavay 256* (E, K); Tali Range, *Forrest 7252* (E, K); Lan-Ping hsien, *Tsai 54031* (A); Tai-pou, *Maire 92* (K); Lao-keou, *Maire 519* (K); Tchou-nen-tseu, *Maire 537* (K); Che-kia-po, *Maire 104* (A, K); west Talifu, *Forrest 4095* (E, GH, K); Taron Valley, *Yu 20180* (E), *Yu 21059* (E, GH), *Yu 19509* (A, E); Ming kwong Valley, *Forrest 7802* (E). SOUTHWEST CHINA–EASTERN TIBET: Chienchuan-Mekong Divide, *Forrest 23588* (K).

The occurrence of glandular hairs on occasional plants does not, in our opinion, merit taxonomic recognition. As a result, the names *Corylopsis glandulifera* and *C. sinensis* var. *glandulifera* are placed in the synonymy of *C. sinensis* var. *sinensis*. Likewise, *C. yunnanensis* is placed in synonymy since the characters used to distinguish plants of this taxon (shorter styles, number and shape of nectaries, and foliage characters) fall within the range of variation encountered for those characters in *C. sinensis*.

Other plants (well known in gardens under the name *Corylopsis willmottiae*) are difficult to distinguish from *C. sinensis* except for their yellow anthers, long inflorescences, and variously pubescent lower leaf surfaces. Herbarium specimens of plants referred to *C. willmottiae* frequently possess a reticulation of the underside of the lamina caused by secondary veins, but this reticulation is by no means a constant character. It would be difficult to maintain plants now passing under the name *C. willmottiae* even as a cultivar due to the lack of constant characters to distinguish the plants from other variants of *C. sinensis*. As a result, we have placed the name *C. willmottiae* in synonymy.

Plants grown under the name *Corylopsis willmottiae* were first introduced by E. H. Wilson in 1909 from western Szechuan, and an Award of Merit was given to the species (exhibited as *C. multiflora*, with which it was confused) by the Royal Horticultural Society in 1912. The garden value of these plants is perhaps due, in part, to the fact that they are tetraploids, not diploids like the majority of plants of *C. sinensis* (see FIGURE 10, d, e).

Although plants segregated as *Corylopsis velutina* are in some ways intermediate between plants of *C. sinensis* and *C. himalayana*, *C. velutina* is placed in the synonymy of *C. sinensis*. This decision has been made after studying the type of *C. velutina*, collected within the range of *C. sinensis* near Dotschang in the province of Szechuan (*Handel-Mazzetti 1810*), and considering the variation encountered in *C. sinensis*.

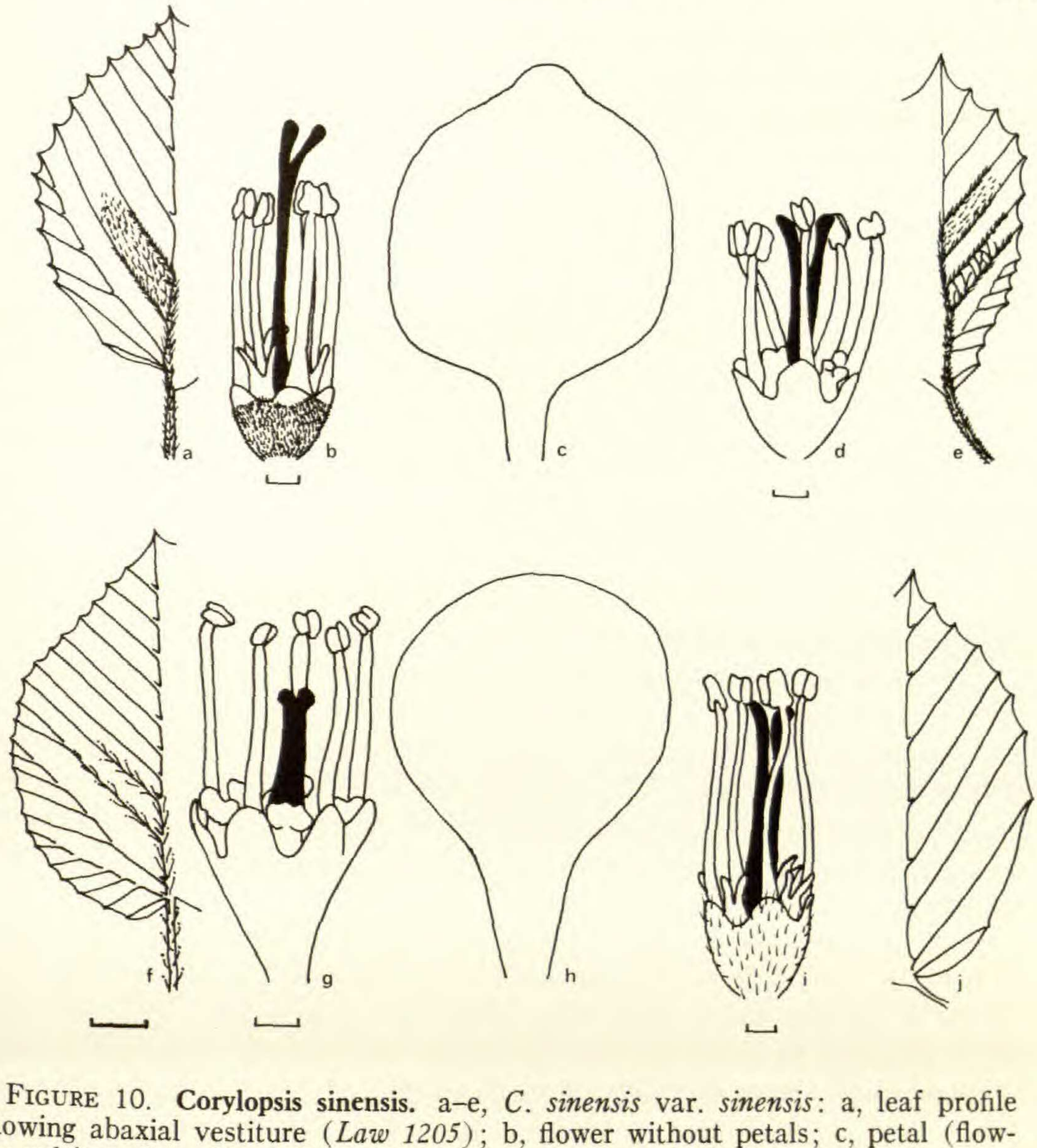


FIGURE 10. **Corylopsis sinensis.** a–e, *C. sinensis* var. *sinensis*: a, leaf profile showing abaxial vestiture (*Law 1205*); b, flower without petals; c, petal (flowers cultivated in Glasnevin as *C. sinensis*); d, flower without petals (cultivated in Glasnevin as *C. willmottiae*); e, leaf profile showing abaxial vestiture and secondary vein reticulations (*Wilson 1316*, holotype of *C. willmottiae*). f–j, *C. sinensis* var. *calvescens*: f, leaf profile showing abaxial glandular vestiture (*Wilson 184*, holotype of *C. platypetala*); g, flower without petals; h, petal (flowers cultivated in Glasnevin as *C. platypetala*); i, flower without petals (cultivated in Glasnevin as *C. veitchiana*); j, leaf profile showing lack of vestiture (*Veitch s.n.*, holotype of *C. veitchiana*).

Only photographs of the *Corylopsis polyneura* holotype have been available to us, but, in conjunction with the type description, it is evident that plants of this taxon relate to *C. sinensis*. The type specimen, *Wang 66783* (not *Wang 66738* as sometimes quoted), was collected from Cham-putong, Yunnan Province, in October, 1935, and is, consequently, of a fruiting plant. Similarly, the type of *C. obovata*, *Ho 51313*, from Yinkiang, Fanching Shan, is also in fruit, having been collected in July of 1931. Although we have not seen the type specimen, the protologue states that the fruits and the abaxial surfaces of the leaves of *C. obovata* are pubes-

cent. These features suggest strongly that the name *C. obovata* is synonymous with *C. sinensis*.

Plants described as *Corylopsis trabeculosa* are intermediate in some features between plants of *C. sinensis* and *C. himalayana*. The holotype of *C. trabeculosa*, *Yu 21059* (not *Yu 21505* as stated by Hu & Cheng, 1948), was collected from Tsunwangtu, in the Taron Valley, on 21 November, 1938 (PLATE I). Another specimen, *Yu 20180* (not *Yu 29480* as stated by Hu & Cheng, 1948), was also collected in the Taron (Kiukiang) Valley, Chunwangtum, Yunnan, and is a fruiting specimen that was collected on 7 September, 1938. The abaxial surfaces of the leaves of these specimens are stated to be densely brown-tomentose, rather like some specimens of *C. himalayana*, and the tomentose infructescence contains 30 or more fruits (PLATE I).

The last species name placed in synonymy of *Corylopsis sinensis* var. *sinensis*, *C. yui*, was based on specimens collected by T. T. Yu (no. *19509*), a collection comprising fruiting material and, like plants of *C. trabeculosa*, also collected in the Taron Valley at Ching-tinglaka Shan. We have seen *Yu 19509* at the Edinburgh Botanic Garden and have received photographs of the holotype housed in the Botanical Institute of the Academia Sinica, Peking. We have also studied a paratype, *Yu 20223*, from the Salwin-Taron Divide west of Wangtzang, which is a specimen with flowers. The pubescent abaxial surfaces of the leaves and the glabrous fruits refer the specimens to *C. sinensis*, and the name *C. yui* is placed in synonymy (see FIGURE 10, a–c). *Forrest 7802* from the "flanks of the Ming kwong Valley," Yunnan, is also intermediate between *C. sinensis* and *C. himalayana* and requires more detailed study. Additional material is needed to arrive at definite conclusions concerning these plants and their relationships since the variation seen in *C. sinensis* var. *sinensis* is not only chromosomal, but may also involve hybridization.

7b. Corylopsis sinensis Hemsley var. **calvescens** Rehder & Wilson, Pl. Wilsonianae 1: 424. 1913. HOLOTYPE: *Wilson 1554* (A!); isotypes (BM!, E!).

C. veitchiana Bean, Curtis's Bot. Mag. **136:** *t. 8349*. 1910. HOLOTYPE: *Veitch 1909* (K!).

Berchemia alnifolia Léveillé, Feddes Repert. **10:** 433. 1912. ISOTYPES: *J. Cavalerie 2712* (E!, K!).

C. alnifolia (Léveillé) Schneider, Feddes Repert. **12:** 379. 1913.

C. platypetala Rehder & Wilson, Pl. Wilsonianae **1:** 426. 1913. HOLOTYPE: *E. H. Wilson 184* (GH!); isotypes (A!, E!, K!).

C. platypetala Rehder & Wilson var. *levis* Rehder & Wilson, *Ibid.* **1:** 427. 1913. HOLOTYPE: *E. H. Wilson 1020* (GH!); isotype (BM!).

C. glaucescens Handel-Mazzetti, Anz. Akad. Wiss. Wien Math. Nat. **62:** 130. 1925. ISOTYPES: *Handel-Mazzetti 9018* (E!, GH!, K!).

C. hypoglauca Cheng, Contr. Biol. Lab. Sci. Soc. China Bot. Ser. **10:** 169. 1936. HOLOTYPE: *Pei 3870* (PE?), Wangshan, Anhwei, not seen.

C. hypoglauca Cheng var. *glaucescens* Cheng, Contr. Biol. Lab. Sci. Soc. China

Bot. Ser. **10:** 126. 1936. HOLOTYPE: *Chen 430* (PE?), Tientaishan, Chekiang, not seen.

C. omiensis Yang, *Ibid.* **12:** 133, 136. 1941. HOLOTYPE: *Wu 10941* (PE?), Omei-shan, Szechuan, not seen.

Shrubs to 4 m.; shoots glabrescent or glabrous, sometimes stipitate-glandular when young; petioles 5–25 mm. long, sparsely stipitate-glandular, sericeous, or glabrous; leaves 5–10 cm. long, ovate to elliptic, with shortly acuminate or rarely retuse apices, cordate to subcordate bases, and sinuately dentate margins with bristle-like, excurrent teeth; abaxial surfaces of the leaf blades glaucescent and sparsely sericeous on the 6 to 11 pairs of veins, or sometimes glaucous and glabrous, the lamina between the primary veins smooth when dry; inflorescences 2.5–5 cm. long, ca. 1 cm. wide, the rachis sericeous or glabrous and glaucous; inflorescence bracts dark brown and glabrous on the abaxial surfaces; floral bracts externally glabrous to sericeous at the margins; flowers 9 to 30, yellow, closely and evenly spaced along the rachis; sepals fleshy, to 2 mm. long, obtusely triangular to ovate, glabrous or sparsely pubescent or rarely ciliate at margin, sometimes glaucous; petals 4–6 mm. long, orbicular to reniform in outline; stamens with yellowish or green filaments, the anthers yellow or red; nectaries 5, longer than the sepals, green or purplish, bifid, sometimes deeply so, the tips acute or obtuse; ovary adnate to the glabrous or pilose hypanthium, the style yellowish or green; capsules glabrous to sparsely pilose, 4–10 mm. in diameter.

REPRESENTATIVE SPECIMENS. **China.** KIANGSI: Kuling, *Wilson 1554* (A, BM, E). HUPEH: Hsing-shan hsien, *Wilson 184* (A, E, GH, K); Changyang hsien, *Wilson 173A* (BM, E, K), *Wilson 65 = 448* (E, K, a mixture of *C. platypetala* and *C. sinensis* var. *sinensis*), *Wilson 173* (A, E, GH, K), *Wilson 449* (K). SZECHUAN: near Mt. Omei, *Chow 11749* (A), *Chow 11418* (A); Tien-chuan hsien, *Chu 2617* (E); Wen ch'uan hsien, *Wilson 1020* (BM, GH); Mupin, *Wilson 2274* (BM); Ching-chi hsien, *Wilson 2273* (E, K); Mao-chou, *Wilson 2272* (E, K); Mo-tsou (= Mao-chou?), *Maire 1241* (E); Omei hsien, *Chien 5581* (E). CHEKIANG: Ping Shan hsien, *Wang 22779* (A); Chen Chiong, *Ching 1767* (E); Tien-tai Shan, *Keng 1062* (A); Tihtaishan, *Ching 1422* (E, K); King yuan, *Ching 2356* (E, K), *Faber 177* (K). ANHWEI: Wang Shan, *Chow 121* (A), *Ching 2965* (E, K), *Ching 2728* (K). KWEICHOW: Fan Ching Shan, *Steward et al. 571* (K); Ma Jo, *Cavalerie 3185* (E), *Cavalerie 7146* (K); Kwei Yang, *Cavalerie 2712* (E, K). YUNNAN: north east of Atuntze, *Forrest 19857* (A); near Bahan (Pehalo), Salween River, *Handel-Mazzetti 9018* (E, GH, K). **Tibet.** EASTERN TIBET: Tsarong, Salwin-Kiu Chiang Divide, *Forrest 20853* (E). SOUTHEAST TIBET: Mt. Kenyichunpo, *Rock 11226* (A), *Rock 10177* (A).

Horticulturists are familiar with plants of *Corylopsis veitchiana*, which have red, exserted stamens and abaxially glabrous leaves. It is not possible to maintain this species, however, when the variation of others is considered. For the purposes of convenience to horticulture it is possible to recognize plants of *C. veitchiana* as a form of *C. sinensis* var. *calvescens*, as follows:

7a$_1$. **Corylopsis sinensis** Hemsley var. **calvescens** Rehder & Wilson forma **veitchiana** (Bean) Morley & Chao, The Garden 102(3): 107. 1977. BASIONYM: *Corylopsis veitchiana* Bean, Curtis's Bot. Mag. 136: *t. 8349*. 1910.

The forma *veitchiana* is recognized by its red anthers and abaxially glabrous leaves, which distinguish it from the other garden plants of *Corylopsis* with red anthers, viz. *C. spicata*. Introduced to Kew by Wilson in 1900 from Changyang in Hupeh Province of China, forma *veitchiana* was later (1908) introduced to North America by the Arnold Arboretum from the same locality. The Changyang area was first explored by Augustine Henry and was worked over by one of his collectors about 1887 (Morley, in press). Unlike garden plants called *C. platypetala* (another name here made synonymous with *C. sinensis* var. *calvescens*), forma *veitchiana* is not diploid but hexaploid and is still available commercially (see FIGURE 10, i, j).

Schneider recognized that *Berchemia alnifolia* of Léveillé was in fact a *Corylopsis*, and he made the necessary transfer in 1913. From an examination of type material of *C. alnifolia*, it is evident that the plant is no more than var. *calvescens*. No useful distinction can be found between either variety of *C. platypetala* and *C. sinensis* var. *calvescens* since all have glabrescent leaves, more or less glabrous hypanthia, and orbicular petals. According to Rehder and Wilson (1913), the differences between *C. platypetala* and its variety *levis* break down because seedling leaves of var. *levis* have the glandular hairs that characterize var. *platypetala*. Furthermore, var. *levis* was described from vegetative material only. We consider both varieties of *C. platypetala* synonymous with var. *calvescens*. Plants passing under the name *C. platypetala* are still in commerce, the var. *platypetala* having been introduced by Wilson from Hupeh in 1907, and the var. *levis* a year later.

Corylopsis glaucescens has never been available commercially, although some forms of *C. glabrescens* from Japan approach the glaucous condition that characterizes the former species. Because we do not think that *C. hypoglauca* or *C. hypoglauca* var. *glaucescens* Cheng can be usefully distinguished from *C. glaucescens*, we make both synonymous with *C. sinensis* var. *calvescens* on the basis of examined type material of *C. glaucescens* and diagnoses. *Corylopsis omiensis* closely approximates var. *calvescens* on the basis of the type description and is, therefore, made synonymous (see FIGURE 10, f–h).

CONCLUSIONS

It has been necessary to reduce many of the described binomials of *Corylopsis* to synonymy in order to begin to make some sort of sense out of the genus. We are aware that this study is only a beginning, but hope that this reassessment may help to stimulate more synthetic research on the group. Except for scattered contributions by workers such as Tong (1930) and Jay (1968), there has been little attention given to *Corylopsis*

apart from the formal and, it seems, sometimes uncritical description of new taxa. The cytology, floral biology, and horticultural value of the group all warrant a more detailed approach both in the field and under cultivation.

Three projects requiring field work suggest themselves from our herbarium- and botanic garden-based studies: (a) a detailed assessment of the systematic relationship between *Corylopsis himalayana* and *C. sinensis* var. *sinensis*, (b) assessment of the variation seen in *C. sinensis* sensu lato, and (c) assessment of the systematic relationship between *C. sinensis* var. *calvescens* and *C. glabrescens*.

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MORLEY & CHAO, CORYLOPSIS

Corylopsis sinensis var. *sinensis* (*Yu 21059*, holotype of *C. trabeculosa*).